DISEASES OF

THE ANUS, RECTUM,

AND SIGMOID

FOR THE USE OF

STUDENTS AND GENERAL PRACTITIONERS

BY

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WITH 152 ILLUSTRATIONS IN THE TEXT

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THIS BOOK
IS GRATEFULLY DEDICATED TO

WILLIAM T. COUNCILMAN, M.D.

IN APPRECIATION OF THE MANY ADVANTAGES AFFORDED ME
BY HIM DURING MY POSTGRADUATE COURSE AT
THE JOHNS HOPKINS HOSPITAL

PREFACE

It is now many months since I set out upon the task of gathering into one volume all the information concerning diseases of the rectum and anus, derived from my own experience and that of others, which would be helpful to both students and the general practitioner. The latter, owing to the nature of the symptoms and the inaccessibility of a specialist, has often the entire treatment in his hands and has to face a situation in which a complete pathological knowledge of the conditions is absolutely essential.

The maladies discussed are very common but very stubborn and particularly annoying and painful. My chief care has been to include the most recent and effective methods of cure and to give these comprehensively and succinctly, knowing a busy doctor will not search for therapeutic or operative technic hidden in verbose phrasing. Nor do I quote many cases only slightly dissimilar, but rather those of rare finding or needed for the elucidation of methods advised.

The pictures, numbering one hundred and fifty-two, most of them specially drawn, are fitly wedded to the text when such union engenders a fuller appreciation of facts stated. The labor of my artist, Walter R. Gale, and the promptness and intelligence with which he has availed himself of every proffered opportunity to witness operations and dissections deserves as much attention from my readers as praise from myself.

In the chapter on Constipation I have striven to write in a form most convenient for reference, and to cover the whole etiological field. In another part of the book are descriptions of certain forms of ulceration not found in any text-book that I know of, such as Infection by Bilharzia Hæmatobia, Actinomycosis, and Spontaneous Gangrene of the Rectum. Con-

PREFACE

genital Idiopathic Dilatation of the Colon (Hirschsprüng's Disease) is also described at length.

Great assistance has been given by my colleague, Dr. Arthur Hebb, who made all the dissections necessary for the original anatomical plates and some of the outline drawings, looked up references, and helped me in so many ways that my most appreciative thanks are due to him. To the members of the Proctologic Society and to my confreres, who have all so courteously and promptly responded to every request, I tender my very cordial thanks.

My thanks are due to Miss Davina Waterson not only for her corrections of the manuscript but also for her kind criticism of the contents, and they are also due to the J. B. Lippincott Company, who have done all in their power to procure the best possible results.

<div style="text-align: right">S. T. E.</div>

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DISEASES OF THE ANUS, RECTUM, AND SIGMOID

CHAPTER I

ANATOMY AND PHYSIOLOGY

BEFORE undertaking a study of the diseases of the anus, rectum, and colon it is necessary that their anatomy and physiology should be studied, or it will be impossible to understand their relation, interdependence, or treatment.

ANATOMY

Development.—The sigmoid and rectum are developed from the hypoblast and mesoblast of the ovum; the anus is developed from the epiblast. From the hypoblast the mucous membrane and probably the submucous tissue develop, while the inner layer of the mesoblast forms the muscular, peritoneal, and glandular portions of the bowel (Shäffer).

Up to the sixth week of gestation the large and small intestines are one cavity of nearly uniform calibre, with the exception of the lower portion of the hind-bowel. After the sixth week the colon and rectum grow more rapidly than the small intestine, and extend downward, approaching nearer the outer layer of the mesoblast and epiblast.

While this development of the rectum is going on an invagination of the epiblast takes place which is called the proctodæum. This invagination increases until the outer and inner layers of the mesoblast are pressed together and absorbed and the epiblast of the proctodæum and hypoblast of the hind-gut approach each other and form a double septum between

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the rectum and the anus; finally this septum is absorbed and
the continuity of the rectum with the anal canal is complete.
The location of the septum, however, is marked by a narrow
zone, whose superficial tissue is neither mucous nor cutaneous
but a transitional form—mucocutaneous—which has been
termed by Stroud the " pecten." The conjunction takes place
generally at a point slightly in front of the posterior end of
the gut, thus leaving a cul-de-sac which is connected with the
neurenteric canal. This cul-de-sac, although largely absorbed
during fetal life, becomes the coccygeal gland of Luschka.

Fig. 1.—Divisions of the pelvic outlet—R..A., right anterior quadrant; L.A., left
anterior quadrant; R.P., right posterior quadrant; L.P., left posterior quadrant; R.A.
and L.A., uro-genital triangle; R.P. and L.P., rectal triangle.

Sometimes, through imperfect absorption, there may be a
congenital posterior rectocele. It is from remains of this cul-
de-sac that dermoid cysts frequently develop in the rectococcy-
geal space.

Pelvic Triangles.—The outlet of the bony pelvis forms an
imperfect double triangle, which may be divided by an imag-
inary line running from the anterior border of one tuberosity
of the ischium to that of the other into an anterior and a pos-
terior triangle. The anterior one is known as the urogenital
triangle and the posterior as the rectal triangle (Fig. 1). The
rectal triangle may be further subdivided by a line running

from the symphysis pubis to the tip of the coccyx into the right and left anterior and posterior quadrants.

The urogenital triangle contains the genito-urinary organs. The rectal triangle contains the anus, rectum, and contiguous tissues. The relations of the parts filling in these two triangles must be thoroughly understood in order properly to appreciate and treat diseases of the rectum.

Fasciæ.—The urogenital triangle is closed in by the perineum, which is bounded by the anus behind, the scrotum in front, and the ischiopubic rami and the ischial tuberosities upon the sides; it is covered superficially by skin, the centre of which forms the raphe. Beneath the skin lies the superficial fascia, which is subdivided into a superficial and a deep layer. The deep layer is firm and close, and is attached at the sides to the entire lower border of the ischiopubic rami and the ischio tuberosities. Its posterior margin is united to the triangular ligament, that of the anterior margin, which is more especially associated with the genito-urinary organs, between which structure and the deep layer of fascia are the transversus perinæ muscles. The superficial layer lies directly under the skin and is loose and areolar, its spaces being occupied with fat-cells.

The deep fascia of the perineum forms a triangle with its apex forward. It extends nearly horizontally sidewise between the lateral walls of the pelvis, and ventrodorsally from the pubic symphysis to the central point of the perineum, which is about an inch in front of the anus. At the base of the triangle the fascia is single, but immediately splits into two layers, the superficial and the deep, between which are situated a part of the urethra with certain of its appurtenances, vessels, and nerves. This is known as the triangular ligament of the urethra.

Fossæ.—The ischiorectal fossæ are the spaces posterior to the perineal spaces and separated from them by the wedge-shaped border of the perineal fascia and the transversus perinæi muscle. They are bounded by the levator ani muscle above,

the obturator fascia, the obturator internus muscle, the ischium, and the sacro-ischiatic ligaments externally, the sacro-ischiatic and coccyx posteriorly, and the skin and superficial fasciæ below. The ischiorectal spaces practically surround the posterior portions of the anus and rectum, are filled with fat and cellular tissue, and are connected by a zone of cellular tissue between the fibres of the levator ani muscle and the anococcygeal ligament. It is through this cellular tissue that pus finds its way from one fossa to the other. It is in these spaces that the blood-vessels and nerves to the anal canal and the surrounding tissues ramify, none of which, however, are of vital importance from a surgical standpoint.

Muscles of the Perinæi and of the Anorectal Region.—The transversus perinæi muscle crosses the posterior border of the perineum from one tuberosity of the ischium to the other, and nearly corresponds to the imaginary line directed to be drawn in dividing the bony outlet of the pelvis; the accelerator urinæ muscle runs through the centre of the space, being covered by the superficial fascia, and these, together with the external sphincter and the sphincter vaginæ in women, unite just in front of the anus to form the common fibrous centre known as the perineal body.

The muscles that are of especial interest in the anatomy of the anorectal region are the corrugator cutis ani, the external and internal sphincters, the levator ani, the coccygeus and the rectococcygeus.

Corrugator Cutis Ani (Fig. 2).—This muscle consists of a thin layer of striated muscular fibres in the deeper layers of the skin surrounding the anus, which in contracting gathers the skin into folds.

External Sphincter (Fig. 2).—This muscle is composed of striated muscular fibres, which, however, have many properties resembling those of plain muscle, to be shown when the rectum is physiologically considered later on. It arises from the posterior surface of the coccyx and the fibrous layer of the skin over this region; passes forward to the posterior

White Line

Superficial Perineal A.
Levator Ani M.

Accelerator Urinae M.

Tuberosity of Ischium

Colles Fascia

Transversus Perinaei M.

Obturator Fascia

Erector Penis, cut
open, exposing A. to Corpus Cavernosum

Perineal Shelf
junction of Colles Fascia
and base of Triangular
Ligament

Artery to the Bulb

Colles Fascia

Tuberosity of Ischium

External Sphincter M.

Pyriformis M.

Gluteus Maximus M.

Coccyx

Obturator Internus M.

Ischio Rectal or Anal Fas.

Great Sacro Sciatic Lig.

Cocygeus M.

Internal Pudic A.

Cut end of Inferior
Hemorrhoidal A.

Inferior Hemorrhoidal A.

Gluteus Maximus
M. reflected.

Corrugator Cutes Ani M.

Obturator Fascia laid open exposing
Alcock's canal.

Sciatic A.

FIG. 2.—Male perinæum.

commissure of the anus, where its fibres divide to surround
this aperture and reunites at the anterior commissure pass
forward to be inserted into the perineal body. In women,
some of its fibres are continuous in front with the fibres of
the sphincter vagina. It is about three inches in length and
half an inch in width. It is composed of a superficial and a
deep layer. The fibres of the superficial layer are circular, and
entirely surround the anus (Fig. 2); the fibres of the deeper
layer are parallel, and lie on each side of the anal canal to the
height of about three-quarters of an inch.

INTERNAL SPHINCTER.—This muscle is composed of an
aggregation of the involuntary circular muscular fibres of the
bowel; it lies immediately above the external sphincter, from
which it is separated by a narrow zone of connective tissue,
and surrounds the upper portion of the anal canal. It is about
one inch in width but is so variable in thickness that it cannot
be accurately measured. The line of separation between the
two sphincters is only perceptible to the touch.

A third sphincter which was formerly thought to exist is
now conceded to be an aggregation of the circular muscular
fibres found at the base of Houston's valves, also that these
fibres extend into the layers of the valves.

LEVATOR ANI (Figs. 2 and 3).—This is a broad sheet of
muscular fibres which form the floor of the pelvis. It arises
from the inner surface of the symphysis pubis, laterally from
the pelvic fascia, where it becomes attached to the obturator
fascia and posteriorly from the spine of the ischium on each
side. Its anterior fibres pass downward and backward to the
central part of the perineum, embracing the prostate; those at
the rear pass downward and mesially to the coccyx, and the
middle fibres, which constitute the bulk of the muscle, run
downward and inward toward the middle line. Some are
inserted in the wall of the anal canal and some into the median
raphe in front of and behind the anal canal. The muscle as a
whole is in the shape of a cone or shield, with its convex sur-

face downward. The upper surface is covered with the recto-vesical fascia. The two muscles, like all the perineal muscles, act in concert. Their contraction lifts the pelvic floor, and tends to counteract the action of the sphincters.

COCCYGEUS MUSCLE (Figs. 2 and 3).—This pair of muscles complete the muscular floor of the pelvis on each side so largely formed by the levator ani. They arise from the

FIG. 3.—Levator ani muscle.

spine of the ischium, expand into a triangle, and are inserted into the margin of the coccyx and the last segment of the sacrum. They act with the levator and pull the coccyx forward when it has been displaced backward, as in defecation (Gerrish).

RECTOCOCCYGEUS MUSCLE.—These are two flat bands of unstriped muscular fibres which have been described by Kohlrausch and Treitz as arising from the coccygeal ligament near the tip of the coccyx, passing forward and downward, and

finally blending with the longitudinal muscular fibres of the rectum and the pelvic fascia around the anus (Tuttle).

Nerve Supply of Anus and Rectum.—This comes from both sympathetic and cerebrospinal systems.

THE SYMPATHETIC NERVE SUPPLY.—While in man the vertebral or stellate ganglia exist only as low as the first and sometimes the second lumbar nerves, there are yet visceral branches given off from the second, third, and fourth sacral
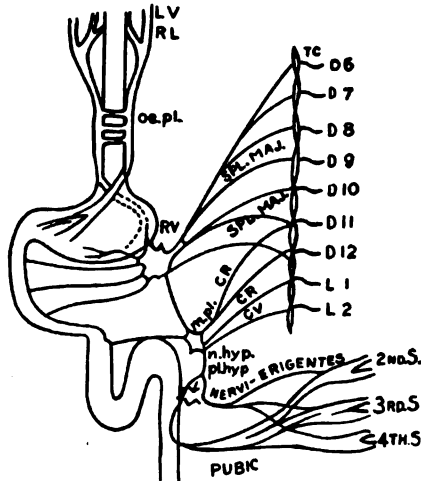
FIG. 4.—Sympathetic nerve supply to the rectum.

nerves to form a part of the nervi erigentes, which may be classed in the same category as autonomic nerves (Langley). These fibres pass directly to one of the prevertebral plexuses, chiefly the inferior hypogastric, or pelvic plexus, the latter of which is a thick network of fibres, rich in ganglia, which lies on either side of the rectum and is made up of a continuation of the hypogastric plexus, offsets from the upper sacral ganglia, and branches from the second, third, and fourth sacral nerves. From this plexus autonomic fibres are distributed to the rectum and internal sphincter (Fig. 4).

CEREBROSPINAL NERVE SUPPLY (Fig. 5).—The cerebrospinal nerve supply to the lower portion of the rectum and

anus comes almost entirely from the pudic nerve, which is made up of branches principally from the third, but also in part from the second and fourth, sacral nerves. The branches of the pudic nerve that supply the anus, surrounding muscles, and skin, are the inferior hemorrhoidal and the deep division of the anterior perineal nerve. The former distributes its branches in a fan-like manner to the external sphincter muscle and to the skin around the anus; the latter also to the external sphincter, the levator ani, and the transversus perinæi muscles. It will thus be seen that the sympathetic nerve supply to the rectum and sphincter muscles comes from the lumbar and sacral portions of the cord; the cerebrospinal from the sacral portion of the cord only (Figs. 4 and 5).

Lymphatics of Anus and Rectum.—Quenu (*Bull. de la Société d'anatomie,* Paris, 1893, p. 399) has shown the anus and rectum to be supplied with three sets of lymphatics, practically corresponding to the arterial supply, namely, the superior, middle, and inferior plexuses. These follow the course of the vessels, the lymphatic glands lying in close apposition with the hemorrhoidal veins.

THE SUPERIOR HEMORRHOIDAL LYMPHATIC PLEXUS, which draws the lymph from the middle and upper portions of the rectum, connects with a chain of lymphatics which lie between the rectum and the anterior surfaces of the sacrum and coccyx, and after extending upward in the cellular tissue between the folds of the mesentery is connected with the prevertebral lymphatic system.

THE MIDDLE HEMORRHOIDAL LYMPHATIC PLEXUS, which originates in the mucous and submucous coats of the anterior portion of the rectum, empties into the hypogastric plexus.

THE INFERIOR HEMORRHOIDAL LYMPHATIC PLEXUS, which originates in the anal and perineal region, does not follow the external hemorrhoidal veins very closely, but ramifies beneath the skin, and after passing forward and upward finally unites with the inguinal lymphatics. It also anastomoses with lym-
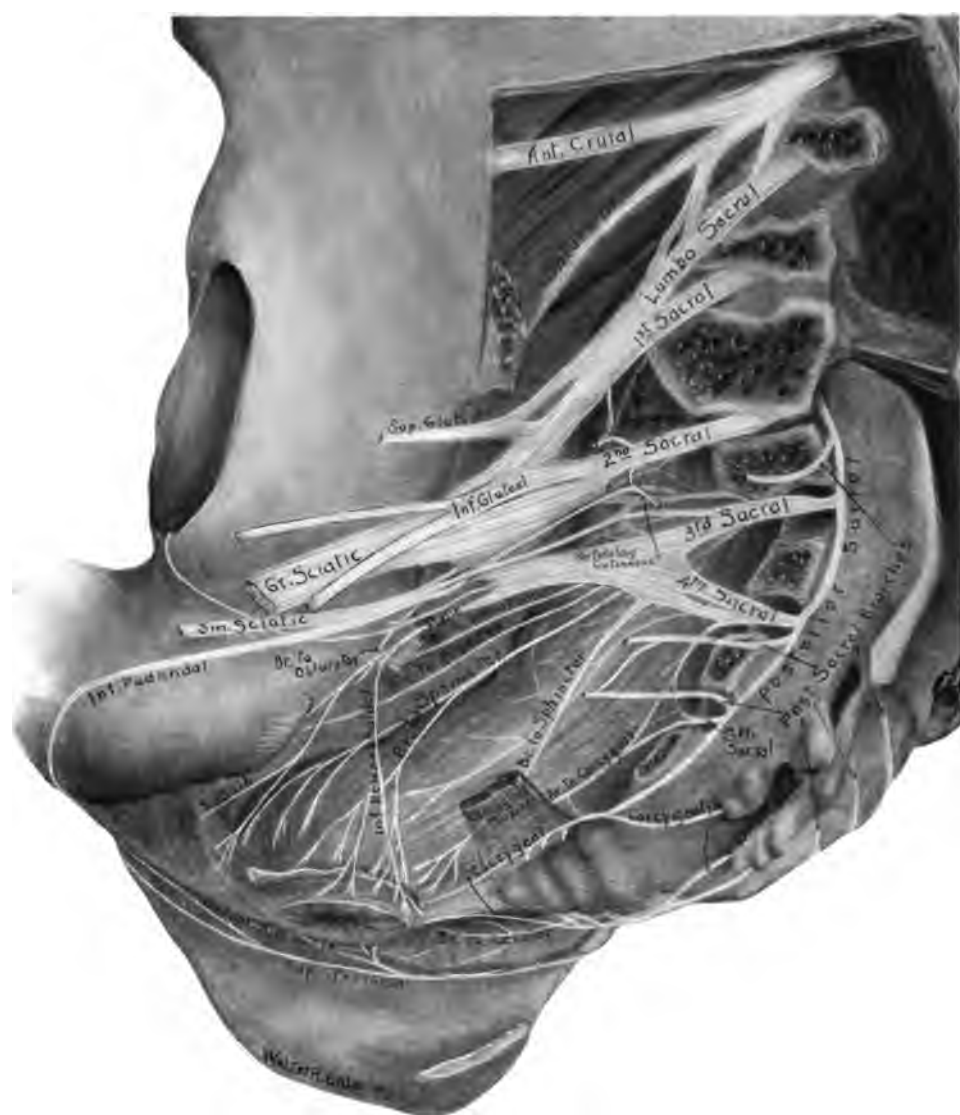
FIG. 5.—Sacral plexus.

phatics of the lower portion of the rectum. Clinical experience corroborates the connection that exists between the inferior hemorrhoidal lymphatics and the inguinal lymphatics, the latter being enlarged from malignant and specific disease of the anal margin.

Rectal folds

Sacro-coccygeal articulation

Hemorrhoidal veins

Levator ani

External sphincter

Internal sphincter

Veins of mucosa of anal canal

Fold of mucous membrane

Bladder

Seminal vesicle

Symphysis pubis

Prostate

Veins

Urethra

Bulb of penis

Internal sphincter

Levator ani

External sphincter
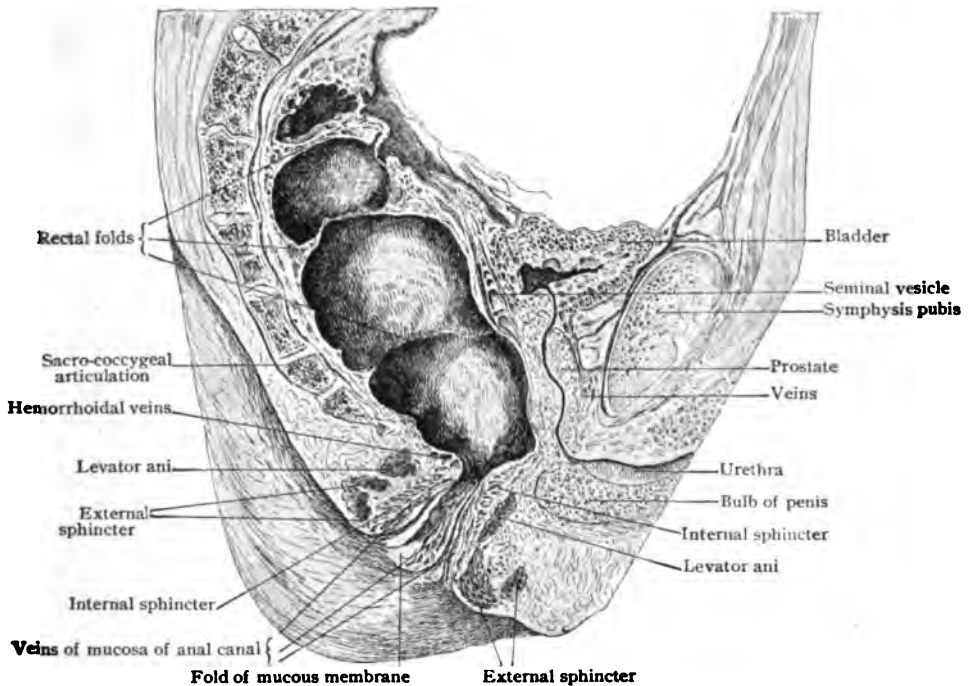
FIG. 6.—Sagittal section of pelvis passing through rectum, anal canal, bladder, and urethra. (Piersol's Anatomy.)

ANAL CANAL

The anal canal (Fig. 6) is a channel by which the rectum empties its contents externally. It is one inch long and runs downward and backward. It is lined with mucous membrane at the upper end and skin at the lower, with a mucocutaneous surface between the two. Outside of this lining the anal canal is surrounded at its lower portion by the external sphincter, some fibres of the levator ani, the longitudinal muscular fibres

of the rectum throughout its extent, and the internal sphincter around the upper portion. The lateral walls of the tube are in contact, and the lining membrane is disposed in small, longitudinal folds. The distal aperture is the anus, and around it the skin is dark brown and puckered in radiating lines. Beneath the mucocutaneous lining of this canal, and separating it from the muscular layer, is a thin fibrocellular layer which closely unites the two adjoining layers. Its circumference is about one and three-sixteenths inches. The walls of the anal canal contain few glands and blood-vessels but are richly supplied with terminal nerves. The canal is covered in its lower portion by stratified squamous epithelium which undergoes a gradual transformation until it ends in the columnar epithelium of the mucous membrane at the anorectal line. There are slight elevations at this anorectal line above the surface of the adjoining mucosa, from five to eight in number, which assume the form of papillæ at their summits. In a large majority of cases they are absent, or, at least, not noticeable, but when well developed they produce many reflex disturbances, which are accounted for by their abundant nerve-supply.

THE RECTUM

The rectum (Fig. 6) begins at the upper termination of the anal canal at the border of the crypts of Morgagni and terminates at a point opposite the front of the third sacral vertebra, where the large intestine ceases to be provided with a mesentery and where the three longitudinal muscular bands of the colon spread out and become equally distributed round the bowel. At this point a decided narrowing in the calibre of the bowel takes place. Its name, which means "straight," is made less absurd by the adoption of these terminal points, instead of extending it as formerly up to the sacro-iliac joint.

The rectum occupies the middle line and forms in its descent a double anterior posterior curve, the cavity of which is directed forward in the superior portion and backward in the inferior, and is divided into two parts. The upper, which

is covered with peritoneum, is about three inches long and extends from the third sacral vertebra to the tip of the coccyx, its course conforming to the curve of these bones, to which it is attached posteriorly. The lower part, which is shorter, bends forward and terminates in a pouch close to the prostate gland in the male and the lower part of the vagina in the female.

The anal opening, instead of being at the end of this pouch and in the line of the curve of the rectum, is located in the

FIG. 7.—Sagittal section of the rectum; Houston's valves, O'Beirne's sphincter.

under side, considerably in the rear of its blunt end. This pouch in front of the anal opening is known as the *rectal ampulla*.

The length of the rectum varies from about 3⅜ to 5⅜ inches in women, and from 4 to 6 inches in men. The circumference varies greatly in different individuals, also at different portions of the canal. The average circumference in the prostatic portion is from 1⅕ to 2 inches; at the widest portion of the ampulla it is from 2²/₅ to 4 inches, and in the

upper or narrow portion from 2 to $2^4/_5$ inches.   Numerous instances have been reported in which these figures have been greatly exceeded.

When the rectum is empty the anterior walls are in close apposition to the posterior walls.

The walls of the rectum are composed from within out of four coats, viz., mucous, submucous, muscular, and serous.

The Mucous Membrane.—The mucous membrane is thicker, rather darker in color, more vascular and more mobile than that of the colon, being very loosely attached through its submucous coat to the muscular wall and frequently being thrown into horizontal folds above and longitudinal below, the latter constituting the columns of Morgagni, between the base of which are found the semilunar valves or the crypts of Morgagni.   It is studded with tubular and muciparous glands, together with many closed follicles.

STRUCTURE OF THE MUCOUS MEMBRANE.—It is composed of three layers, viz., epithelial, glandular, and muscular.

The epithelial layer consists of columnar cells throughout the rectum proper but changes to stratified cells at the extreme lower end.   Beneath the epithelial is the glandular layer, in which are thickly set the glands of Lieberkühn; besides these are the goblet or mucus-secreting cells.   The intertubular tissue is a net-work of long meshes, which are supposed to constitute the lymph-paths.   There are also found between the glands of Lieberkühn small nodules of lymphoid tissue.

The muscular layer of the mucous membrane, which is known here, as elsewhere, as the muscularis mucosa, is better developed in the rectum than in other portions of the colon.

Submucous Layer.—The submucous layer is a very loose net-work of elastic and connective-tissue cells.   It is rather better developed and more elastic than at any portion of the intestinal canal.   In it ramify the blood-vessels, nerves, and lymphatics.

Muscular Wall.—The muscular wall is composed of circular and longitudinal fibres arranged in separate layers.

THE CIRCULAR (INNER) LAYER is distributed irregularly, being aggregated at certain levels and spread out at others. This aggregation is especially marked at the lower extremity, where it forms the internal sphincter. These muscular fibres throughout the rectum are separated by connective-tissue fibres, which probably accounts for the rapid development of connective-tissue in inflamed conditions of these organs.

Other aggregations of circular muscular fibres occur at different portions of the rectum, especially at the base of Houston's valves, between the layers of which they enter; also, as described by O'Beirne: another aggregation of these circular fibres is found at the juncture of the sigmoid and rectum. It is claimed that the contraction of these fibres causes the constriction at this point, a fact easily demonstrated by the proctoscope.

LONGITUDINAL LAYER.—The longitudinal muscular layer is directly outside the circular layer, and is a continuation of the three longitudinal muscular bands of the colon which form the beginning of the rectum and are spread out evenly over the surface of the rectum, though probably a little thicker in front and behind. Some fibres of this layer are inserted below into the superior pelvic fascia, covering the levator ani muscle; others mingle with those of the levator ani and are attached with them to the rectal wall; the remaining fibres pass below the two sphincters and are inserted in the superior fascia around the anus.

Serous Coat.—The serous coat is deflected around the rectum from behind to the front, beginning about the third sacral vertebra. It is reflected externally upon the sides of the pelvis, thus forming the lateral supports of the rectum. Anteriorly, after dipping down for a short distance, it is reflected upon the bladder in males and the uterus in females, thus forming Douglas's cul-de-sac, which contains loops of the small intestine, the sigmoid flexure and sometimes the cæcum and ovaries. The depth to which the serous coat dips down between the

rectum, uterus, and bladder varies in individuals and under different conditions; the latter varying with the fulness of the bladder and rectum and is nearer the anal margin in women than in men. The extreme measurements vary from $1\frac{1}{5}$ to $4\frac{3}{4}$ inches.

Columns of Morgagni.—As was previously stated, the mucous membrane of the lower portion of the rectum is gathered into longitudinal folds by the contraction of the sphincters; these folds are known as the columns of Morgagni and also as the pillars of Glisson (Fig. 7). They are, of course, obliterated by dilatation of the canal. Between each pillar the dentate margin of the upper limit of the anal canal is stretched across, forming the semilunar valves, the sides of the two pillars; the semilunar valves internally, and the rectal wall externally form the *anal pockets* or *crypts of Morgagni* (Fig. 7).

The pillars, varying in number from six to twelve, are about half an inch in length; and gradually lost in the smooth rectal wall above. The depth of the crypts of Morgagni vary in different individuals; in some scarcely noticeable, in others measuring from three to five millimetres. They are also invariably absent at the anterior and posterior commissures. These pockets when pronounced frequently contain foreign substances which may give rise to great annoyance. The function of these valves and pockets is practically unknown; they, probably, result from the puckering of the rectal wall by the contraction of the sphincter muscle.

Valves of Houston.—As mentioned in speaking of the distribution of the circular muscular fibres in the rectum, there are aggregations of these fibres at different levels, several of which were mentioned as being at the base of and entering into Houston's valves. These valves can be seen in the inner wall of the distended rectum by inflating the same through a proctoscope, or as in Fig. 7. In number they vary from one to five; ordinarily there are three: superior, middle, and

inferior. The middle valve, which is the most constant, rises from the right anterior quadrant of the rectal wall and varies in location with the depth of Douglas's cul-de-sac, being situated just below it. The inferior valve is located upon the left posterior quadrant about one inch above the margin of the anus, and the superior valve is in the same quadrant, at from $3^3/_5$ to $4^2/_5$ inches above the anal margin. There is always a well-developed fold or valve at the junction of the rectum with the sigmoid, originally described by O'Beirne, who attributed to it the function of maintaining the fecal mass in the sigmoid flexure until just before the time of defecation. It is situated slightly anteriorly and to the right or left side, according to the direction of the flexure of the sigmoid upon the rectum, and is more accentuated in those cases in which this flexure is acute. The rectal valves, crescentic in shape, protruding into the cavity of the rectum, varying in extent from one-third to one-half of its diameter, are attached to the wall of the bowel for a little more than one-half of its circumference. As stated by Houston in his original paper (1830), they consist of two folds of mucous membrane separated by cellular tissue and muscular fibres. Subsequently Martin and Pennington demonstrated varying amounts of fibrous tissue, Schaeffer and other histologists also agreeing upon this subjacent layer of fibrous tissue. At its base in the submucosa are seen the arteries and veins for its special nutrition, also some lymph-nodules and large sympathetic ganglia. According to Martin, circular muscular fibres are found at the base of the valves. These fibres may in some instances extend to the middle and even to the free border of the valves. Martin also states that sometimes the longitudinal muscle spans the base of the valve without deflection. The base of the valves where they join the rectal wall is much thicker than the free border and convex on their surface. Their attachment to the rectal wall is not a horizontal plane, but is effected spirally, being slightly higher at the upper than at the lower junction, which

gives easy exit to the fecal matter, letting it down from a higher to a lower plane gradually.

In their normal condition the valves are usually thin and flexible, offering little resistance to the passage of fecal matter. A more detailed description of these valves is given in T. C. Martin's article (*Philadelphia Medical Journal*, 1899), and that by J. Rawson Pennington (*American Medical Journal*, December, 1900). It has not been shown in any examination hitherto made that the peritoneum dips into the groove at the base of the valve. The function of these valves is to support the fecal mass through the rectal canal, and to ease it down gradually. Being attached to the wall of the rectum on an incline plane, they impart to the fecal mass a rotary motion.

Arteries.—Those that supply the rectum are the superior, middle, inferior hemorrhoidal, and middle sacral.

THE SUPERIOR HEMORRHOIDAL ARTERY (Fig. 8).—This, the terminal division of the inferior mesenteric artery, passes down between the folds of the mesorectum, and at the level of the second sacral vertebra divides into two, sometimes three, divisions; the left branch being distributed to the left side and to the anterior surface of the rectum, the right branch to the right side and the posterior surface of the bowel. Penetrating the muscular wall of the rectum about $4\frac{1}{2}$ inches above the anal margin, they subdivide into numerous branches and descend in the submucous coat, terminating in the lower limits of the rectum. They anastomose with branches from the middle hemorrhoidal and middle sacral arteries.

THE MIDDLE HEMORRHOIDAL ARTERY.—This generally arises from the hypogastric artery, but may arise from the internal iliac or the prostatic. It passes through the superior pelvirectal space, distributing some branches to the anterior surface of the rectum and others to the seminal vesicles and prostate in men and to the vagina in women. It also supplies the levator ani muscle.

THE INFERIOR HEMORRHOIDAL ARTERY (Fig. 2) arises from the internal pudic, crosses the ischiorectal fossa obliquely
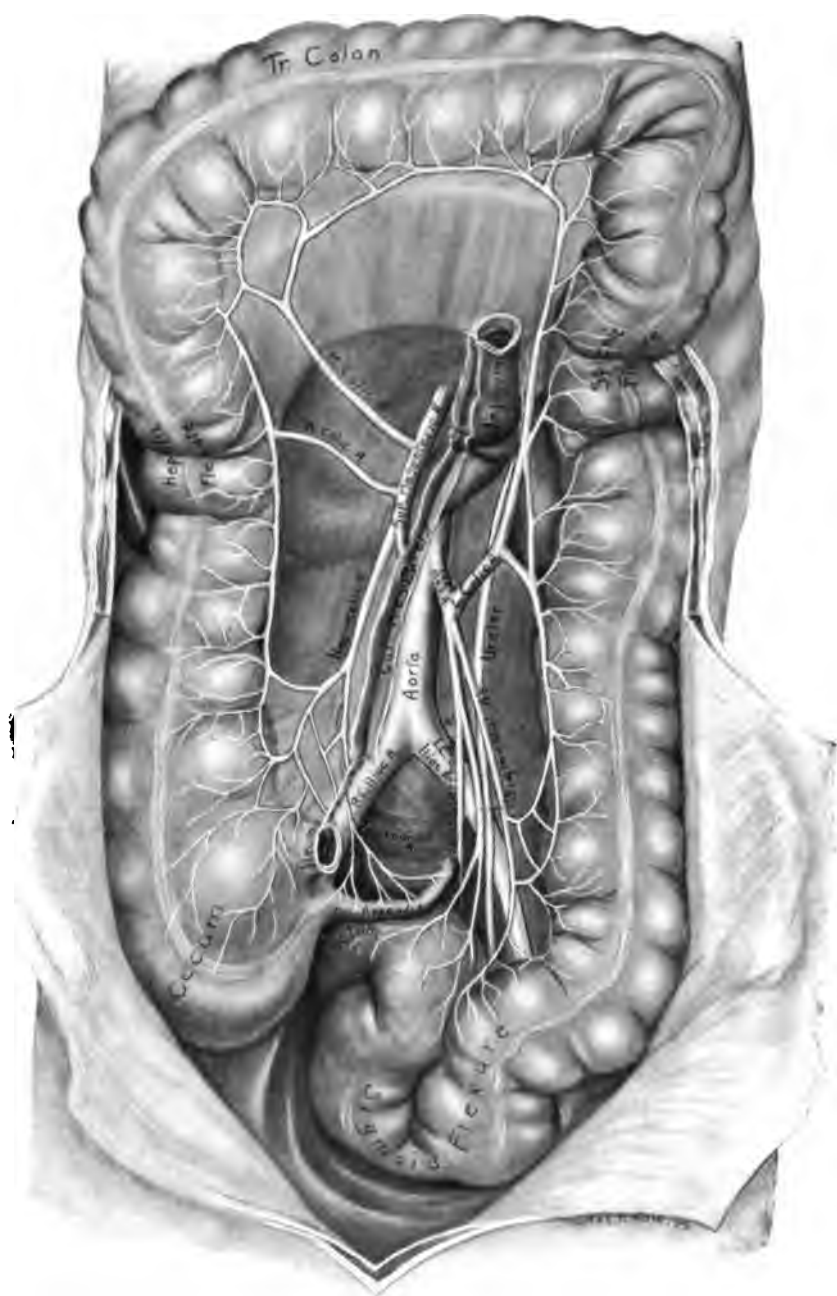
Fig. 8.—The blood supply to the rectum, sigmoid and colon.

from behind and externally, and supplies the levator ani, the two sphincters, the skin, and the superficial fascia around the anus.

THE MIDDLE SACRAL ARTERY arising from the posterior portion of the aorta just before it divides into the common iliacs, supplies the posterior surface of the rectum. Most of these arteries anastomose freely with each other.

Veins.—The veins of the rectum correspond in name and direction to the arteries, but the superior hemorrhoidal veins return their blood through the inferior mesenteric veins into the portal circulation. This forms the venous supply of the rectum proper. The middle and external hemorrhoidal veins and the middle sacral veins collect the blood from the anus and its immediate surroundings and return it to the general circulation through the vena cava. The dividing line between the circulation of the rectum proper, the anus, and its surrounding tissues is the anorectal line, but under certain conditions the blood from the two systems intermingles, through anastomosing branches. According to Quenu and Testut these anastomosing veins are provided with valves, and this interferes with the communication between the two systems, except in certain directions. The beginning of the internal hemorrhoidal plexus is marked by small venous sacs or pools about the size of a grain of wheat. These little pools surround the rectum just above the anorectal line; from them small veins proceed in all directions, and above the margin of the internal sphincter they unite to form large trunks.

Cellular Spaces Surrounding the Rectum.—Surrounding the rectum there are certain cellular spaces which must be understood in order to appreciate its relations to adjoining organs, and how collections of pus are retained and confined to certain localities. That portion of the organ between the peritoneal attachment above and the superior surface of the levator ani below is surrounded entirely by cellulo fibrous tissue, in which the blood-vessels, nerves, and lymphatics ramify. It is deeper behind than in front. The outer portion

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of this layer is fibrous and originates in the fascia lining of the true pelvis. It is reflected from the pelvis in a double layer at the points where the lateral sacral arteries diverge, the inner of which attaches itself to the sides of the rectum. These folds form the lateral ligaments of this portion of the rectum, as described by Jonnesco and Ombredanne and are its principal supports at this point. The outer layer of this fascia is attached along the border of the sacrum. Between these layers posteriorly is a cellulovascular layer, which extends from the superior fascia of the levator ani, below, upward between the layers of the mesorectum, to connect with the prevertebral cellular layer of the abdominal cavity. This is known as the retrorectal space.

This fibrocellular space surrounding the rectum is further subdivided by the lateral ligaments of the rectum into the anterior cellular space, which separates the rectum from the prostate and seminal vesicle in men, and from the broad ligaments and uterus in women. This anterior cellular space is bounded in front by an aponeurosis which is closely attached to the prostate, extends over the seminal vesicles backward, and with the lateral ligaments is attached to the sides of the rectum. It is also attached to the anterior wall of the rectum, thus subdividing this anterior space into two spaces known as the superior pelvirectal. In women this aponeurosis is attached to the upper surface of the vagina and to the base of the bladder. It is in these anterior spaces that abscesses originating in the genito-urinary organs often develop and open into the rectum high up, or frequently burrow upward and forward, opening in the inguinal region. Collections of pus in the retrorectal space are not likely to extend into the pelvirectal space, on account of the intervening lateral ligaments of the rectum, which separate the two, but they generally open into the rectum or into one of the ischiorectal fossæ.

The Relation of the Rectum.—The relation of the rectum with the adjoining organs is as follows: Anteriorly at its lower portion with the prostate and membranous urethra in

men, and with the posterior vaginal wall in women. Passing upward, it is in relation with the urogenital organs, but not so closely, a space being left between, known as the perineal body. This lower portion of the rectum laterally is in relation with the external sphincter ani, the levator ani muscle, and fascia; posteriorly with the same muscle and with the cellular tissue which separates the rectum and the gland of Luschka from the coccyx. The peritoneal portion of the rectum is in relation anteriorly with the bladder, prostate, and seminal vesicle in men, and with the vagina in women. Posteriorly to and above these points is the peritoneal cul-de-sac called prostatovesical in men, and Douglas's cul-de-sac in women. This cul-de-sac contains a portion of the sigmoid flexure and loops of the small intestine, with which the rectum is in relation.

Below the peritoneum laterally and posteriorly, as stated before, the rectum is surrounded by cellular tissue, until the muscles below are reached. In this cellular tissue posteriorly is to be found the sacral plexus, sympathetic ganglia, and the fascial origin of the pyramidal muscles. These relations show that the rectum is not so closely related to the pelvic contents but that it can be removed, taking proper care, without injury to any of the important organs, and shows it to be fixed in its normal position. The supports of the organ are the peritoneum and its connective-tissue attachments to adjoining organs above, below with the external sphincter, levator ani, and rectococcygeus muscles, and its fibrous attachments to the coccyx, prostate, or vagina. In the middle portion are the fibrocellular tissue and the lateral ligaments.

SIGMOID FLEXURE

The sigmoid flexure is that part of the large intestine which is so tortuous as to suggest its resemblance to the Greek letter sigma. It is the most movable portion of the large intestine. It is continuous below with the rectum opposite the third sacral vertebra at the median line. It begins on the plane of the crest of the left ilium, passes down within an inch and a

half of Poupart's ligament, bends sharply towards the middle line, crosses the psoas magnus muscle, dips into the cavity of the true pelvis, rises to the brim on the right side, and thence curves backward, downward, and inward, to join the rectum. It is fourteen or more inches long. For its uppermost three inches it has a serous covering on its front and sides only, but below this it has a mesocolon for its entire length. Its mesocolon is much longer in the middle portions than toward the end, and is frequently so abnormally long in its middle as to give rise to acute flexures in this portion of the bowel. Its diameter is less than the descending colon above, and gradually diminishes toward its lower end. The three longitudinal muscular bands are continued for the greater part of its course, but as the end is approached those that are behind spread out and join their fellows, so that the rectum begins with a uniform outer muscular layer (Fig. 8).

The walls of the sigmoid are composed of four layers, the mucous, submucous, muscular, and serous.

The Mucous and Submucous Layers.—The mucous and submucous layers differ in no essential from those of the rectum, except that the solitary follicles are not so numerous, the mucous membrane is not quite so thick, so loosely attached, nor so redundant as to allow it to be thrown into folds.

The Muscular Layer.—The arrangement of its longitudinal muscular layer has already been described. The circular fibres are distributed much more evenly than around the rectum.

The Serous Layer.—The part taken by the peritoneal layer in the formation of the mesosigmoid has also been described. Otherwise it surrounds the sigmoid as it does the small intestines. Hensing and Roser first pointed out the funnel-shaped cul-de-sac formed at the point where the mesosigmoid crosses the iliac artery, a little to the left of the median line. Around this orifice are situated arteries above and at the sides. It is an important guide to the location of these vessels and can be seen by turning the sigmoid upward.

Blood Supply.—The blood supply of the sigmoid is through the sigmoid arteries, which are branches of the inferior mesenteric artery; they anastomose with the colonic arteries above and the superior hemorrhoidal arteries below (Fig. 8).

The veins of the sigmoid follow the same course as the arteries and empty into the inferior mesenteric vein.

The Nerve Supply.—These are principally autonomic fibres, with the exception of a few of the sensory type, which are derived from the lumbar and sacral plexuses.

The sigmoid when empty lies almost in the pelvic cavity; it is therefore called the pelvic colon. When distended by gas or fecal matter it rises into the abdominal cavity.

PHYSIOLOGY OF THE ANUS, RECTUM, AND SIGMOID

The function of the anus is to furnish exit for the fecal matter, it being provided also with mechanism for controlling discharges for a certain time, or, when under the control of the will, until convenient. This control is effected both by voluntary and involuntary muscles, viz., the external and internal sphincters. Usually the anus is closed, except when the sphincters are inhibited in their action and the musculature of the rectum impels the fecal mass through it.

The function of the rectum and sigmoid is for the retention and storage of fecal matter until sufficient has accumulated and the time is convenient for its discharge.

The movements of the large and small intestines are similar, except that in the former they are more infrequent, so the contents are moved along more slowly and become more solid from the absorption of the fluid portion, until in the form of fæces it reaches the sigmoid colon and rectum. Cannon, from his studies of the normal movements in cats, as seen by the Röntgen rays (Howell's " Text-Book of Physiology," page 649), comes to the conclusion that movements in the large intestine show a marked peculiarity previously overlooked. He divides the large intestine into two parts;

in the second, corresponding roughly to the descending colon, the food is moved toward the rectum by peristaltic waves. A number of constrictions may be seen simultaneously within a length of a few inches, whereas in the ascending and transverse colon and cæcum the most frequent movement is that of anti-peristalsis. The food in this portion of the canal is more or less liquid, and its presence sets up running waves of con-striction which, beginning somewhere in the colon, pass toward the ileocæcal valve. These waves occur in groups separated by periods of rest. The presence of the ileocæcal valve pre-vents the material from being forced back into the small intes-tine. The value of this peculiar reversal of the normal move-ment of the bowels, at this particular point, would seem to lie in the fact that it delays the passage of the material toward the rectum, and by thoroughly mixing it gives increased oppor-tunities for the completion of the processes of digestion and absorption. As the colon becomes filled some of the material penetrates into the descending part, where the normal peri-stalsis carries it toward the rectum. Howell says, " the large intestine, particularly the descending colon and rectum, receives its nerve-supply from two sources: (1) Fibres which leave the spinal cord in the lumbar nerves (second to fifth in the cat) pass to the sympathetic chain, and thence to the inferior mesenteric ganglia, which probably forms the termina-tion of the preganglionic fibres. From this point the path is continued by fibres running in the hypogastric nerve and plexus. Stimulation of these fibres has given different results in the hands of various observers, but the most recent work indicates that they are inhibitory. (2) Fibres that leave the cord in the sacral nerves (second to fourth) form part of the *nervi erigentes,* and enter into the pelvic plexus. When stimulated these fibres cause contractions of the muscular coats; they may be regarded, therefore, as motor fibres. As in the case of the small intestine and stomach, we may assume that these motor and inhibitory fibres serve for the reflex regulation and adaptation of the movements."

Defecation.—When the fæces reach the sigmoid colon and rectum, the nearly solid material stimulates by its pressure the sensory nerves of the rectum and produces a distinct sensation and a desire to defecate.

As stated, the internal sphincter is a strong band of plain muscular fibres, formed by an aggregation of the circular muscular coat of the rectum, hence composed entirely of involuntary fibres. When the rectum contains fecal material this muscle seems to be thrown into a condition of tonic contraction until the act of defecation begins, when it is relaxed. The internal sphincter is innervated by fibres having the general course given above for the nerves of the large intestine. The external sphincter ani is composed of striated muscle fibres and is under the control of the will to a certain extent.

When, however, the stimulus from the rectum is sufficiently intense, voluntary control is overcome and this sphincter is also relaxed. The act of defecation is in part voluntary and in part involuntary. The involuntary factors are found in the contractions of the strongly-developed musculature of the rectum, especially the circular layer which serves to force the fæces onward, and the relaxation of the internal sphincter. It would seem that these two acts are mainly caused by reflex stimulation from the lumbar spinal cord, although it is probable that the rectum, like the rest of the alimentary tract, is capable of automatic contractions. The rectal muscles receive a double nerve-supply, containing physiologically both motor and inhibitory fibres. The former come probably from the nervus erigens by way of the pelvic plexus; the latter from the lumbar cord through the corresponding sympathetic ganglia, inferior mesenteric ganglion, and hypogastric nerve. It has been asserted that stimulation of the nervus erigens causes contraction of the longitudinal muscles and inhibition of the circular muscles, while stimulation of the hypogastric nerve causes contraction of the circular muscles and inhibition of the longitudinal layer. This division of activity has not been confirmed by recent experiments.

The voluntary factor in defecation consists in the inhibition of the external sphincter. Although the act of defecation is normally initiated by voluntary effort, it may also be aroused by a purely involuntary reflex when the sensory stimulus is sufficiently strong. Goltz has shown that in dogs in which the spinal cord had been severed in the lower thoracic region, defecation was performed normally. In later experiments, in which the entire spinal cord was removed, except in the cervical and upper part of the thoracic region, it was found that the animal, after it had recovered from the operation, had normal movements once or twice a day, indicating that the rectum and lower bowels acted by virtue of their intrinsic mechanism. An interesting result of these experiments was the fact that the external sphincter suffered no atrophy, although its motor nerve was destroyed, and that it eventually regained its tonic activity.

It would seem that the whole act of defecation is, at best, an involuntary reflex. The physiological centre for the movement probably lies in the lumbar cord and has sensory and motor connections with the rectum and the muscles of defecation, but this centre is probably provided with connections with the centres of the cerebrum, through which the act may be controlled by voluntary impulses and by various psychical states, the effect of emotions upon defecation being a matter of common knowledge. In infants the essentially involuntary character of the act is well known (Howell, pp. 650, 651).

It will be seen that of the two sphincter muscles that guard the anal outlet to the rectum, the internal is entirely under the control of sympathetic impulses; these in turn are under the influence of a centre in the lower portion of the lumbar cord, which is influenced under normal conditions either by impulses through these reflex fibres or by impulses from the cerebral centre above. This lumbar centre may also be influenced by strong reflex impulses through peripheral nerves. The external sphincter is a striated muscle and is supplied by cerebrospinal nerves, viz., the inferior hemorrhoidal and the

deep division of the anterior perineal nerve, both of which are branches from the pudic nerve, which in turn is made up from branches from the second, third, and fourth sacral nerves. The external sphincter is, therefore, to be reckoned as a voluntary muscle, but from what follows it will be seen that this muscle is a notable exception to the rule, and possesses certain characteristics of both voluntary and involuntary muscle-fibre. For instance, the sacral fibres through which it is supplied are under the influence of the same centre in the lumbar cord as that which influences the internal sphincter. This centre, as I pointed out, is also influenced by the cerebral centre, and, certainly, so far as the external sphincter acts under the latter's control, is a typical voluntary nerve; but, when separated from this cerebral centre, it acts just as well, only automatically under the control of the lumbar centre. Therefore the local nervous mechanism consisting of both cerebrospinal and sympathetic nerves which connect the two sphincters with the lumbar centre is complete for all purposes and can carry out the functions of the rectum and anus without control and supervision from the higher centres. This will be further seen by reference to the researches of Frankl-Hochwart and Frohlich on the tonus and innervation of the sphincters (*Pfleger's Archives*, vol. lxxxi, p. 420). They quote a number of facts which indicate that the properties of the external sphincter resemble those of plain muscle. For example: (*a*) It shows no degeneration after destruction of the cord, thus differing from ordinary striated muscle (Goltz). (*b*) It shows no degeneration after section of the sacral branches, constituting the origin of its motor nerves (Arlving and Chautre). (*c*) Its curve of contraction (when stimulated through its nerve) differs from the usual skeletal muscle, in having a longer latent period, and slower contraction and relaxation. (*d*) (Their own experiment.) It is not paralyzed by curare anything like so rapidly as ordinary striated muscle.

As already stated in speaking of their functions, the rectum and sigmoid are the receptacles for fecal matter, it being,

however, more constantly present in the latter than in the former. I cannot, however, concur in the belief formerly expressed, that the rectum is always empty except just before defecation, or with the theory of O'Beirne "that the fecal matter is lifted back into the sigmoid by a retroperistaltic action after it has remained in the rectum for a short time."

As generally known, absorption of fluids and nutrient material still continues to take place in the sigmoid and rectum through the glands of Lieberkühn; consequently, whenever fecal material is detained for some time in the sigmoid and rectum it becomes much drier and firmer. By reason of this property the rectum and sigmoid are used for the administration of nutrient enemas and certain drugs. But, in the use of either, it should be remembered first to clear the bowel of fecal matter, and next to administer the injection with the hips well elevated, in order that it may be distributed over as large a surface as possible.

CHAPTER II

EXAMINATION

THE importance of a thorough examination of the anus, rectum, and sigmoid cannot be over-estimated, and I would impress upon every general practitioner the advantages to be gained therefrom and the great reflection upon himself and the profession that follows its neglect whenever occasion requires. Unfortunately, it far too frequently happens that a case is sent to a specialist by a general practitioner either not examined at all, or in a most casual and unsatisfactory manner. It would seem that there is as much (if not more) dislike for such examination on the part of the attending physician as on the part of the patient, whose own diagnosis is accepted and a prescription given without any further examination. This practise cannot be too strongly condemned, as it is perfectly feasible for every physician to have the few necessary instruments, the most important being the index finger.

History.—The first thing to be done when a patient presents himself is to obtain a clear and distinct history of the trouble for which he seeks advice, with a succinct relation of all the symptoms complained of. The family history, as well as the personal history of the patient, will frequently throw much light upon the case, and sufficient time should be taken to obtain this data. Before proceeding to make a physical examination, it is necessary that the rectum and sigmoid should be emptied of their fecal contents by enemas of tepid water, which can be administered in the physician's office if the conveniences are at hand, or the patient can be given a purgative, with instructions to return the following day.

POSITION—LEFT LATERAL OR SIMS'S.—The best position in which to place a patient for an ordinary examination of the rectum is the left lateral of Sims, with the hips elevated and

the shoulders and head lowered to form an angle of from 15 to 20 degrees. This position is probably the most convenient for the examiner and entails less exposure to the patient. It can be done on an ordinary office table, or on one of the many special chairs or tables made for this and gynæcological purposes.

KNEE-CHEST POSITION.—Another position that offers special advantages particularly for the upper portion of the

FIG. 9.—Knee-chest position.

rectum and sigmoid is the knee-chest position, which apparently is not properly appreciated, being seldom used by any except specialists (Fig.9). To obtain the advantages offered by this position it is very necessary that certain rules be adhered to. The table on which the patient is placed should be of such a height that when the position is assumed the anus should either be slightly below or on a level with the eyes of the examiner. The thighs of the patient should be at right angles

with a line drawn through the acetabula, his chest in direct contact with the surface of the table, the arms being spread out and the head turned to one side, so as to allow the side of the face also to rest upon the surface of the table. This position empties the pelvis of a large portion of the sigmoid and all of the intestines and relieves the rectum of pressure from the adjoining organs, so that when the anus is opened with a single-bladed speculum or proctoscope the air will rush in and balloon the rectum, as is the case with the vagina under similar conditions.

Mathews and Hanes, of Louisville, Kentucky, have devised a table for the examination of patients in the inverted position. I give a description of position and table by Dr. Mathews and the cause that led to it from the " Transactions of the American Proctologic Society," 1908, p. 36.

" The circumstances which led to the use of this position were met with in a patient whom Dr. Hanes was treating for a tubercular lesion in the upper portion of the rectum. This patient had an unusually long sacrum and coccyx, with the curve of each much exaggerated. Hanes found it very difficult to make local applications to the lesion through the proctoscope with the patient in the knee-chest posture. When the instrument was introduced, the distal end, in following the hollow of the sacrum, was pointing upward when the lesion was brought into view, which made it necessary to get under the proximal end of the instrument to view the bowel, often imperfectly distended. This was an exceedingly awkward position. If it were desired to pass a liquid agent into the bowel it would immediately return. By gradually inverting the patient, from time to time, it was found that the view and means of treatment were correspondingly improved until it was ascertained that the maximum amount of good could be obtained by completely inverting the patient. Finding such material advantage in the employment of this position in this case, we took occasion to practise it on other cases. It is not difficult to see that in this posture the abdominal viscera will

more completely gravitate toward the diaphragm and, therefore, the sigmoid and rectum will be drawn upon and brought more nearly in the direction of a straight line. This aids materially in ballooning the bowel and, therefore, renders more easy the introduction of the instrument. Again, the surgeon is in an absolutely easy position, standing as he does over the patient, looking directly down into the bowel; and in making topical applications to any part of the rectum and sigmoid it is done with perfect ease and comfort to the surgeon. There is not a more successful way known by which a high enema may be given. The water is poured into the proctoscope as though it were a funnel. When it is necessary in our office to give an enema, especially where we wish the solution to pass into the sigmoid, we always employ this position. It is done with the greatest ease and there is no doubt about the water passing into the sigmoid and colon. And, again, it is very often desirable to pass a small quantity of a solution of some kind to a definite point in the sigmoid or rectum; and this can be done with absolute precision by the employment of this position."

" By the use of our table (Fig. 10) the patient can take a standing position in front of it and, leaning slightly forward, be thrown into a completely inverted position without any effort upon his part. He is firmly supported and feels thoroughly secure in this posture, and when the treatment is completed, the patient is brought back to a standing position by reversing the movements of the table."

EXAGGERATED LITHOTOMY POSITION.—Another position which is preferred by some, and which possesses certain advantages, is the exaggerated lithotomy position (Fig. 11), in which also the patient's hips should be elevated, the head and shoulders lowered, the thighs acutely flexed over the abdomen, with the legs acutely flexed on the thighs. This position is the one generally used for operations and has certain advantages in making examinations; sometimes the sigmoidoscope can be introduced in this position when it has failed to enter

its full length in Sims's or the knee-chest position. It also offers the opportunity in females of ascertaining the relation of the uterine organs to the rectum.

FIG. 10a.—Mathews and Hanes examining table for the inverted position.

FIG. 10b.—Showing the table inverted.

FIG. 10c.—Showing the patient in position on the table.

FIG. 10d.—Showing the patient and table inverted.

External Appearances.—Having placed the patient in position, the external appearance of the anus and its immediate surroundings should be carefully noted: Is the anus protruding or retracted and funnel-shaped? the epidermis dry or

moist, inflamed or excoriated? are any parasites or pediculi present? and specially note if there are any fistulous openings, sometimes so small as only to be seen with great difficulty, or external growths, swellings, ulcerated surfaces, or protrusions. The buttocks should then be pulled well apart and the patient requested to bear down, which will bring into view most of the anal canal.

Fig. 11.—Lithotomy position.

DIGITAL EXAMINATION.—The information to be gained by touch, through a well-educated index finger, for the first four inches of the rectum, is probably greater than by any other means. The finger should be well lubricated and carried in by a slow, steady, and gentle pressure, but if the anus is very sensitive and irritable, where a fissure is present, this form of examination had better be omitted until the patient is etherized. The lubricant should be kept in a collapsible tube to avoid infecting it by soiled fingers, as may happen when it is kept in jars. The character of the information to be

gained by digital examination is varied and far-reaching, such as being able to recognize the presence of enlarged papillæ, growths, and ulcerations where they have involved the deeper tissues, indurations, either localized or general, the internal opening of a fistula, if large or raised, foreign bodies, strictures, and procidentia recti. The characteristics of growths and the extent to which they involve the rectal walls or adjoining organs can be appreciated much better by this means than by any other.

THE INTRODUCTION OF THE HAND INTO THE RECTUM.— Since the feasibility of this procedure was demonstrated by Simon, of Heidelberg, in 1872, the advisability of examining the large bowel high up by this means has been very seriously questioned, and Tuttle has reported four cases in which death followed the operation. This author believes that a hand that requires a kid glove larger than 7¾ should never be introduced into the rectum except in an emergency involving life or death. It should always be done under the influence of a general anæsthetic and only when the coats of the bowel are in a healthy condition, as, for instance, for the extraction of foreign bodies, or fecal impaction, or for exploring the pelvic cavity.

Necessary Appliances.—*Table.*—Probably the best all-round and most convenient table is that made by the W. D. Allison Company (Fig. 12). I find this most convenient, more presentable, occupying less space, and more easily moved than the chairs generally used.

Instrument Cabinet.—It is also well for the doctor to have in his office an instrument cabinet for the convenience of having instruments, solutions, and basins ready at hand; for preservation of instruments, and for the good impression such neatness and conveniences make. A very convenient cabinet is that made by the W. D. Allison Company (Fig. 13).

Light.—Since the introduction of the pneumatic proctoscope and sigmoidoscope the subject of artificial light for rectal examinations has been satisfactorily solved. A storage

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battery not only answers every purpose for lighting the small lamp of the proctoscope but is really better than the street current, which is so likely to burn it out.   When a proctoscope

FIG. 12 —W. D. Allison's examining table.

FIG. 13.—W. D. Allison's cabinet.

is not obtainable, a head-mirror for reflected light will probably serve the best purpose; this is also more likely to be readily available.

Specula.—The choice of a speculum will depend first upon the portion of the canal to be examined. If only a part or the whole of the anal canal, I certainly prefer a single-bladed one specially constructed to meet the conditions. While its mechanism on general principles should be similar to Sims's vaginal speculum, it must be more pointed at the end, much more distinctly curved from tip to base, narrower from side to side, and more deeply curved in its cross section, or, to put it clearer, with higher sides, in order to prevent the rectal folds from protruding over the sides of the speculum. Such an instrument I had made some ten or twelve years ago (Fig. 14).

FIG. 14.—Earle's single-blade speculum.

This is specially adapted for the examination of fissures, when only the tip is introduced to pull back the opposite anal wall; also for irrigating the rectum preparatory to an operation after the patient has been placed under the anæsthetic. Here it can be turned in any direction while scrubbing the opposite wall; at the same time it serves the purpose of dilating the sphincters. A Sims speculum may be made to answer the same purpose, but is not nearly so satisfactory. Dr. Dwight H. Murray has recently devised a very good one (Fig. 15) which has the merit of being introduced with little discomfort to the patient; and of being withdrawn without added discomfort, allowing a good view of the part to be examined, and of being easily cleaned and sterilized.

For higher examinations in the rectum and sigmoid the pneumatic proctoscope and sigmoidoscope are *par excellence* the best. Those designed by Laws and Tuttle are preferable, the latter being more recent in construction and correcting some defects of the former. They both have an electric illumination stem which carries the light to the far extremity of the proctoscope. In Tuttle's instrument the stem for carrying the light is run in a groove external to the lumen of the tube,

FIG. 15.—Murray's speculum.

thereby not interfering with its calibre or with the view to be obtained through it. In both the extreme end of the cylinder for the light is protected by a flint glass bulb, guarding the light from the intestinal discharges and at the same time not interfering with illumination. Tuttle's instrument is made in several lengths from four to fourteen inches and varying in diameter from seven-eighth to one and one-fifth inches. The four-inch instrument is long enough for all examinations of the rectum, the ten-inch instrument for the rectum and lower portion of the sigmoid, while the fourteen-inch instrument is

only necessary in persons with long sigmoids or loose meso-colons, and for the purpose of seeing into the lower portion of the descending colon (Fig. 16).

THE LIMIT OF OCULAR EXAMINATION.—While reference has been made to the possibility of examining into the descending colon, Tuttle and Abbott have both shown by numerous experiments on the cadaver that this cannot be done. According to Abbott, of Minneapolis, Minnesota (*American Gynæc. and Obstet. Jour.*, July, 1900, p. 20), a straight tube passed
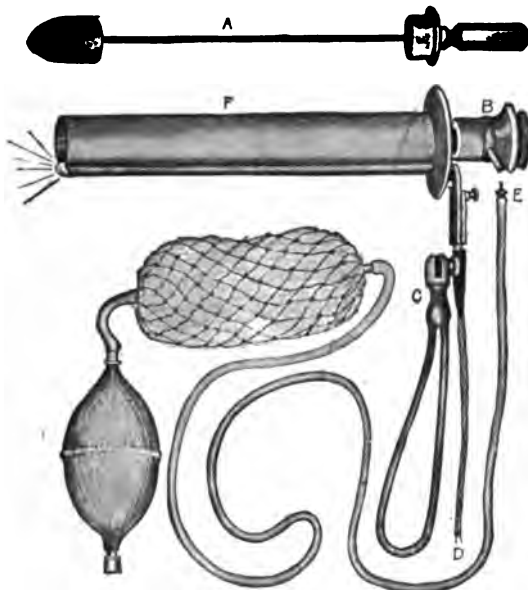
FIG. 16.—Tuttle's pneumatic proctoscope (Tuttle) Appleton. *A*, obturator; *B*, plug with glass window closing end of tube; *C*, handle; *D*, cords connecting instrument with battery; *E*, inflating apparatus; *F*, main tube of proctoscope.

further than twelve inches would impinge against the liver or diaphragm; therefore a twelve-inch proctoscope is the longest permissible.

Each of these instruments is provided with an obturator for the purpose of its easy introduction beyond the sphincters. This should be done in Sims's position for rectal examination, and in the knee-chest position for examination of the sigmoid.

In Tuttle's instrument a plug, ground to fit air-tight, is inserted in the proximal end when the obturator is withdrawn. This plug contains a plain glass window, or a lens focused to the length of the instrument to be used. The cavity of this plug is connected by a small tube which enters it at a position adjoining to the inner side of the glass window and is for the purpose of connecting its cavity and the cavity of the proctoscope with a hand-bulb for inflation of the rectum. As soon as the obturator is withdrawn the plug is introduced and by gentle inflation with the hand-bulb the rectum is dilated ahead of the instrument, which is gradually introduced, the electric light being turned on and the inspection of the rectal walls made as the instrument passes slowly up; care should be taken to use no undue force either in pushing the instrument in or in over-distending the rectal walls by inflation. (A full description and the instrument can be obtained from the Electrosurgical Instrument Company, Rochester, N.Y.). When necessary to make an application to an ulcer on the rectal wall, the spot should be directly in front of the end of the proctoscope, the plug at the proximal end removed and the application made with long forceps through the proctoscope. In this manner successive ulcers can be treated at the same sitting. To avoid condensation of moisture on the glass window of the plug, which occurs during prolonged examinations and materially obstructs the view, the plug itself should be dipped in hot water before being inserted in the end of the proctoscope.

Dr. J. Rawson Pennington, Chicago, Illinois, has devised a very good tubular bivalve speculum obviating the difficulties of the ordinary bivalve rectal speculum, as it possesses an obturator which enables it to be used primarily as a tubular speculum by withdrawing the obturator and subsequently, if necessary, as a bivalve (Fig. 17). It was designed more specially for a dressing speculum.

DILATORS.—I think that of the different methods recommended for rapid dilatation, probably the best mechanical one

is the metallic conical dilator devised by Dr. Howard A. Kelly (Fig. 18). Dilatation by the fingers is a time-honored method, perfectly safe and efficient.
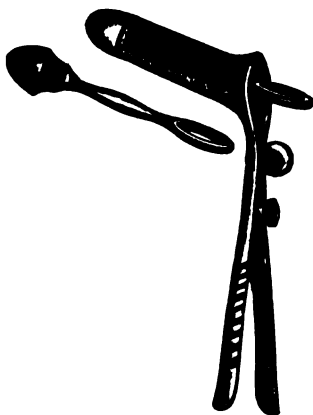
FIG. 17.—Pennington's bivalve speculum.

FIG. 18.—Kelly's graduated conical dilator.

For the gradual or rapid dilatation of the anal canal the dilatable rubber bags (Fig. 19) suggested and described by Dr. Dudley Roberts, Brooklyn, New York, are excellent.

The advantages of a dilatable bag for overcoming the contraction of the uterine cervix are well known.   Such dilatation is under the entire control of the operator; it may be as

FIG. 19.—Dudley Roberts's rubber bag dilators.

gradual and as distensive as demanded.   The force is exerted in the proper direction, not pushing the tissues ahead of a dilating instrument.

The instrument shown in the accompanying illustration (one-half actual size) has been under trial for many months and in that time has proved to me that failures of gradual dilatation have been due to intrinsic faults of former instrumental methods. Patients who had been subjected formerly to treatment with the largest size rubber bougies, having a circumference of 9 cm., have been better able to stand dilatation with this bag expanded to the full size, a circumference of 14 cm. at the constricted portion. It seems to be perfectly feasible to accomplish gradual dilatation of the anus to the necessary degree with comparatively little discomfort. The induced anæmia of the tissues pressed upon must contribute to this analgesia. The muscle is gradually tired out and relaxes just as the fingers must if an effort is made to hold the bag against expansion. The smoothness of the instrument obviates any tendency to spasm during introduction. Withdrawal causes no dragging on the mucous membrane.

The apparatus consists of an inner bag of rubberized cloth, the ends made bulbous to prevent slipping inward or outward when distended. To this bag is attached a tube of like material on the end of which is fastened a small stop-cock and a hand-bulb, valved to prevent the backward passage of air, is attached to it. Within the bag and extending through a portion of the tube is a slender metal rod with bulbous ends; a simple means of giving the collapsed bag sufficient rigidity during introduction. Outside the strong dilating-bag is a thin elastic cover free from seams, which gives a perfect smoothness to the bag at all stages of dilatation. The seams and wrinkles of the inner bag are not perceptible through this cover.

The method of use is exceedingly simple and few directions are necessary. The condition of the valves in the hand-bulb must be determined, as back leaks make dilatation impossible. The number of slight " squeezings " necessary to fill the bag is a matter of individual experimentation, also the tension indicates when the bag is full and further distention impossible. Let the bag be well dusted with talcum powder or covered with

an emollient, the elastic cover slipped on and turned around to completely lubricate apposed surfaces. Two-thirds of the length of the bag are introduced, the bulbous portion protruding from the anus, and slow dilatation is started. When discomfort is caused the stop-cock is turned and a few minutes allowed to elapse in order that voluntary and involuntary spasm may be relaxed. Gradually the dilatation is continued, and when as much as possible has been secured the bag is left in place for ten to fifteen minutes. The patient is instructed to lie flat on the back and relax completely. Successive treatments follow and each time dilatation is found to be easier, until a normal condition is established.
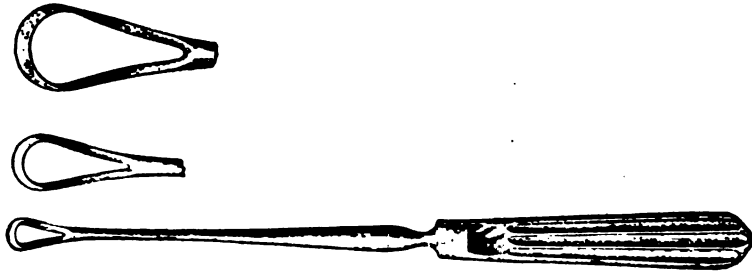
FIG. 20.—Rectal curette.

The advantage of this form of instrument in the treatment of strictures of the rectum above the anus is well seen. Through a speculum the bag is introduced and placed in the desired position, when stretching to the necessary degree is readily accomplished.

A larger size than that shown in the cut is necessary in some instances, and to meet this demand I have had one constructed without the central constriction; this has a circumference of 18 cm. throughout, the smaller one measuring 14 cm. in the central portion and 16 cm. at the bulbous ends. The same sized cover answers for both bags.

APPLICATORS AND DRESSING FORCEPS.—The instruments used for making applications to anus or rectum should be sufficiently long to be used for similar applications up in the

rectum through the average length proctoscope. Long dress-
ing forceps and curette with which to make scrapings
from ulcers (Fig. 20) should be among the instruments
found on a doctor's table. He should also possess a pair of
Bransford Lewis 12-inch alligator forceps (Fig. 21), that
may be used through the longest proctoscope for the abstrac-
tion of foreign bodies; these are specially applicable in catch-
ing and twisting off small multiple polypi and a most neces-
sary part of his armamentarium.
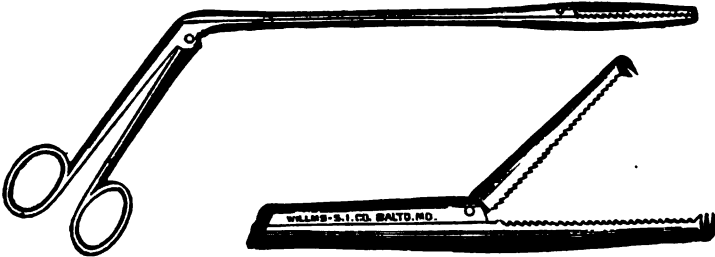
FIG. 21.—Alligator forceps.

FIG. 22.—Silver probe.

FIG. 23.—Grooved directors.

PROBES AND GROOVED DIRECTORS.—Several graded sizes
of silver probes and grooved directors are also necessary (Figs.
22 and 23). Blunt hooks of different shapes and sizes are
useful for examining the crypts, valves, and internal blind
fistulæ of the rectum.

Dr. Dwight H. Murray has devised a scrotal holder and
shield which will be found most satisfactory and useful when
operating on male patients (Figs. 24 and 25).

Bougies.—Used now principally for the dilatation of strictures (having been superseded by the proctoscope for diagnostic purposes), these should be very flexible, conical, cylindrical, and of graded sizes, usually from 1 to 12. Those made by Wales are of soft rubber, and are by far the best. The old English rectal bougie was made of web and shellacked, thus securing a smooth surface which by soaking in hot water becomes somewhat flexible; not sufficiently so, however, to be used without great care. In fact, all bougies should be used with such care, especially as the tissues in cases demanding their use are easily torn. I do not recommend the metallic vertebrated bougies. The instrument should be thoroughly lubricated before introduction and passed very gently upward

Fig. 24.—Murray's scrotal-holder and shield.

until an obstruction is met, when an ordinary Davidson bulb or fountain syringe is attached to the proximal end and the water allowed to flow in through the small lumen; this will push out of the way any folds of mucous membrane or masses of fecal matter. This is seldom necessary in cases to which the use of the bougie is now restricted, viz., strictures in which there are no redundant folds, unless the stricture is very high up and here its use is contraindicated.

In making examinations where there are neoplasms, let a specimen be removed for microscopic examination for a correct diagnosis. In all obscure conditions, a careful macroscopical and microscopical examination of the bowel should be made, and also a bacteriological examination of discharges from the bowel.

Examination of the Fæces.—A microscopical, bacterio-
logical, and chemical examination of the fæces should not, I
think, be explained in a work on diseases of the anus and
rectum; it belongs more properly to general medicine and to
the gastro-enterologists. A macroscopical examination of the

Fig. 25.—Murray's scrotal-holder and shield in position.

fæces assists materially in diagnosing intestinal obstructions
low down, by the shape of the fecal masses when moulded, or
the presence of ulcerations, malignant or benign, and of pus,
blood, or mucus in the fecal discharges. When special forms
of ulceration exist our diagnosis should be made upon micro-

scopical examinations of the scrapings from the ulcers rather than the fæces. The consideration of such examinations I will take up later.

The number of evacuations in normal individuals varies from one to three in twenty-four hours, or one in forty-eight to seventy-two hours, in the latter interval without any apparent ill-effects, local or general. It is better, however, to advise these patients to overcome such a habit and to have a stool daily, as the continuation of such a torpid condition of the bowels will likely lead to bad results in the end. While the stool of a healthy person may be either moulded or mushy, yet there is a condition of consistency in the stool of persons who are perfectly regular in the daily evacuations of their bowels that will frequently furnish an explanation for abnormal lesions, such as a fissure or eroded and bleeding internal hemorrhoids. I allude to a very dry and hard condition of the first portion of the stool, which requires so much effort to move it and is so dry as to give rise to the trouble above mentioned. The recommendations for the relief of this trouble will be considered under the head of Constipation.

The presence of foreign matter that has been taken in with the food and passed out with the fæces need only be referred to, to warn the physician against mistaking it for living organisms or the dead remains of such. To avoid such a mistake it will frequently be necessary to resort to the use of the microscope.

Enteroliths are sometimes found in the fæces. They are intestinal calculi and concretions, the nature of which will be considered hereafter. Attention is called to them here, in treating of a macroscopical examination of the fæces, that they may be recognized when seen.

The mucus, which in normal conditions is secreted only in sufficient quantities to serve as a coating to the bowel, may be very much increased, and discharged in considerable amounts, in various pathological lesions of the intestines, both large and small. When present in such undue quantities a special

investigation as to its cause and origin is indicated. The special causes giving rise to it and the evacuation of blood or pus will be considered under special headings, though the blood from very low down or very high up in the bowel differs so materially in macroscopical appearance that it may be well to refer to it here more in detail. This distinction may always be made: When it is bright red its origin is always low down, at or near the anal margin, and when dark purple or nearly black, the latter often being of a tarry consistency, the source of the bleeding is always high up in the bowel, its extrusion being thereby delayed and time given for the changes in its normal characteristics above noted.

The presence of parasites, vegetable cells, muscular fibre, oil globules, and fibrous tissue may all be recognized by the naked eye, but may require the aid of the microscope for differentiation.

The examination hitherto alluded to can generally be made with proper care and patience without giving rise to much pain or calling for the aid of an anæsthetic, but frequently the anus may be so hyperæsthetic and irritable as to demand the use of local or general anæsthesia. It is far better that the physician should recognize this readily, without persistent efforts to make such an examination. As a rule he can gain from the history and symptoms sufficient knowledge of the existing condition to be prepared to do any minor operation while the patient is under the anæsthetic for the examination. It is generally better for him to postpone the examination until he can do both.

Anæsthesia in Rectal Disease.—While many minor operations on the anus and rectum, including the forcible dilatation of the sphincters, can be done with perfect satisfaction under local anæsthesia when used with the improved technic of Tuttle and Gant, yet in the majority of rectal operations it will be found more satisfactory to use general anæsthesia, unless specially contraindicated. The sensibility of the parts is so acute that it is very difficult to overcome all resistance offered

by the sphincters, hence there are frequently pathological conditions which should be removed that are overlooked when local anæsthesia is used.
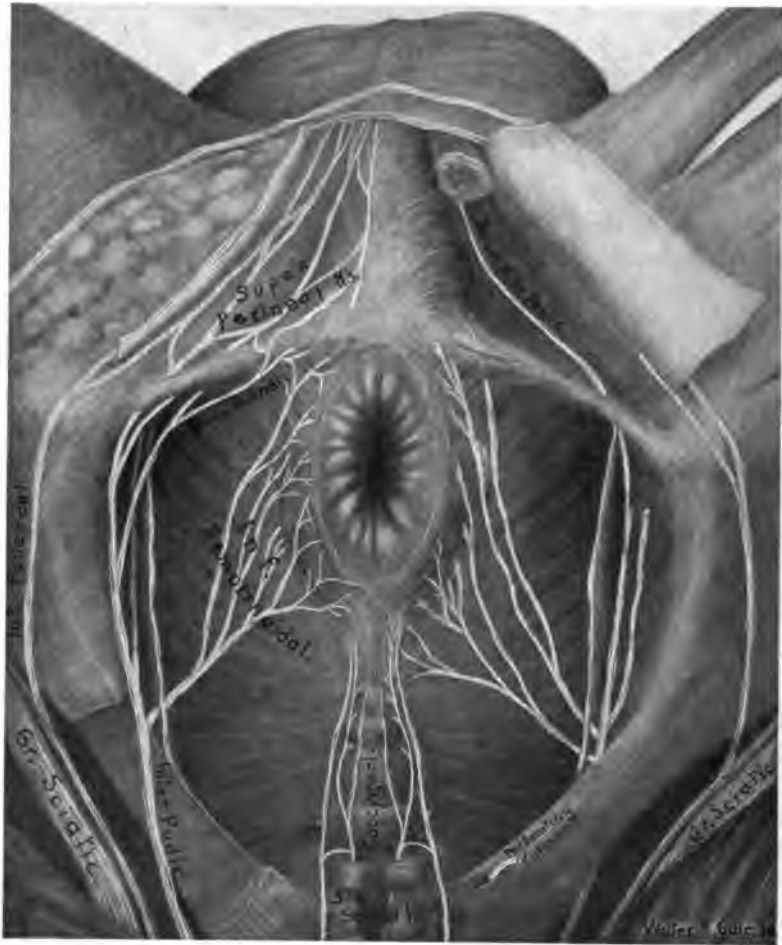
FIG. 26.—Showing perineal nerve supply for local anæsthesia.

LOCAL ANÆSTHESIA.—The best for use in this locality are weak solutions of cocain or beta-eucain, from ¼ to ½ of 1 per cent., freshly made and sterile. Tuttle's technic is as

follows (Fig. 26) : An hypodermic needle two inches in length is introduced in the median line one-half inch back of the posterior commissure of the anus, and a drop or two of the solution is injected into the subcutaneous tissue; the right index finger is then introduced into the rectum and hooked around the internal sphincter, thus dragging it down into apposition with the external; the needle is then carried upward and forward into the sphincters one after the other, depositing about 5 m. of the solution in each muscle at a point about one-half inch in front of the posterior commissure; the needle is then easily withdrawn and introduced in a like manner into the muscle on the opposite side of the posterior commissure; 20 to 30 m. of the solution in all are used. After about two or three minutes Earle's single blade speculum is introduced into the anterior commissure of the rectum, and with this as a point of resistance the sphincters are gently massaged and stretched to any desirable extent. I do not claim that the sphincters can be divulsed, or the perirectal tissues torn down by this method without pain, but I do maintain the sphincters can be stretched sufficiently for all practical work under local anæsthesia. Over one hundred cases have been operated upon by myself and my associate, Dr. Lynch, up to this writing, with practically no failures, and the method has been demonstrated to a large number of visiting doctors during the past six months at the Polyclinic Hospital. The points in which I claim originality are the single puncture, thus minimizing the dangers of infection and the localization of the sensitive nerves of the sphincter. After the sphincter is stretched the hemorrhoids or ulcers should be anæsthetized with a mild solution ($\frac{1}{8}$ to $^{1}/_{10}$ per cent. of the drug employed), as the anæsthesia has not extended to the cutaneous margin of the anus in the anterior quadrants. In fissure no second puncture is necessary, as the first usually suffices. The class of cases to which this method of anæsthesia is applicable includes those very sensitive and painful conditions in which a satisfactory examination cannot be made without some form of anæsthesia,—viz., dila-

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tation of the sphincters, incision and dissecting out of fissures, opening up fistulous tracts, removal of polypi, removal of hemorrhoids by almost any method except Whitehead's, in fact all minor operations on the anus and rectum.

The propriety and advisability of doing many of these operations under local anæsthesia in the office is very questionable, unless the patient is allowed to recline for an hour or more after the operation before being allowed to leave.

A well-grounded objection to the use of local anæsthetics in many of these operations is the fact that the distention of the tissues by the injection, necessary in order to obtain thorough anæsthesia, so distorts the parts to be removed, also the tissues that are to remain, that it frequently happens an insufficient amount is taken away, resulting in necessity for second operation. Hemorrhage is also more likely to follow local anæsthesia by cocain, due to its raising the blood-pressure.

I cannot do better here than quote from an article in the *Journal of the American Medical Association,* October 23, 1909, on "Quinin and Urea Hydrochlorid as a Local Anæsthetic," by Arthur E. Hertzler, M.D., Ph.D., Associate Professor of Surgery, University of Kansas; Roger B. Brewster, M.D., and Ford B. Rogers, M.D., Dispensary Assistant, University of Kansas, Kansas City, Kansas:

"In September, 1907, Dr. Henry Thibault, of Scotts, Arkansas, published a short article calling attention to the local anæsthetic effect of quinin and urea hydrochlorid. He recommended the use of a 1 per cent. solution for local injection and from 10 to 20 per cent. for local application to any mucous surfaces. Aside from this article by Dr. Thibault and one by E. J. Brown, recommending its use in tonsillectomy, we have been unable to find in the literature any account of the use of these substances for anæsthetic purposes.

"For some six months we have been using this drug instead of cocain in all local anæsthesias with the greatest satisfaction. So great has been the interest manifested in our studies

by our professional friends that we have deemed it best to report results up to date. Clinical experience was obtained in our private practice and by one of us (Rogers) at the dispensary of the University of Kansas. The experimental work was done in the laboratory of the Halstead Hospital (Hertzler).

"We started with the 1 per cent. solution recommended by Dr. Thibault. We found, as stated by him, that a perfect anæsthesia is obtained which lasts from four to five hours. The anæsthesia is more complete than with cocain. We soon discovered, however, that disturbances in skin union sometimes occurred. One of us (Hertzler) noted particularly that in hernia operations there was some disturbance in the healing of the skin wound which had not been noted after the use of cocain. The disturbance was not great, but the patient had to be kept in bed longer than after the cocain operation. The edges of the wound were indurated and thickened, but there was no pus formation. The thickening appeared to be due to cellular infiltration.

"Hertzler thereupon undertook to determine experimentally the cause of the induration. Experiments performed on rabbits showed that the thickening was not due to cellular infiltration at all, as was supposed on clinical grounds, but was due to a pure fibrinous exudate free from cells. This exudate was proved to be fibrin by Mallory's and Weigert's stain. The reaction appears, therefore, to be purely chemical in nature. The exudation of the fibrin begins to appear within a few minutes. In a general way it was determined that the amount of exudate depends on the strength of the solution used; the attempt was made, therefore, to determine a strength of solution which would not cause the exudation of fibrin. In ½ per cent. solutions the exudate is less than with 1 per cent. and with ¼ per cent. solutions only traces can be discovered. To what extent this fibrinous exudate is subsequently converted into fibrous tissue has not been definitely determined, but apparently nearly all is absorbed.

" In order to determine the subjective sensations of the injection and to determine the question of a possible zone of hyperæsthesia about the anæsthetized zone, one of us (Hertzler) studied the effect by the injections in the skin of his leg. Injections of 1 per cent., ½ per cent., ¼ per cent., and $^1/_6$ per cent. solutions and an injection of plain water as controls were used in each series. The 1 per cent. and ½ per cent. solutions gave immediate and complete anæsthesia without a párticle of pain during its introduction. Within a few minutes there was a distinct induration. With the ¼ per cent. solution, anæsthesia was not complete for a few minutes, but was then as complete as after the use of the stronger solutions. The $^1/_6$ per cent. solution gave delayed anæsthesia, which after a few minutes was complete. In neither of these weaker solutions was induration noted on palpation. The water control caused intense pain on injection, and the anæsthesia, at no time perfect, lasted only a few minutes. There was a zone of hyperæsthesia one or two inches in width about the area injected. Curiously enough, the hyperæsthesia seemed to be for touch and not for pain.

" The duration of the anæsthesia in the 1 per cent. and ½ per cent. solutions was perfect for four or five days, and sensation in the ½ per cent. strength was not restored to any great extent for ten days, and in the 1 per cent. solution sensation was not completely restored after two weeks. At no time was there the least pain, though the induration about the 1 per cent. and ½ per cent. solutions was yet marked at one and two weeks respectively.

" The above observations were made with the solution of the quinin in water. When physiologic salt solution was used as the solvent, the induration was little or not at all marked, but the duration of the anæsthesia was much lessened. Hypotonic and hypertonic solutions also were used without notable variation.

" The result of this experimentation indicated that the delayed skin union above noted was due to fibrinous exudate.

This was present in the 1 per cent. and the ½ per cent. solutions but not in the ¼ per cent. solution to any notable degree. The ¼ per cent. solution seemed then, on laboratory grounds, to be the strength most desirable for anæsthesia in the class of work where speedy primary union of the skin is desirable and where duration of anæsthesia beyond several hours is not required, and clinical experience seems to bear out the laboratory determinations.

" Any operation ordinarily done with cocain can be done with quinin. The technic of its use is the same. As in the use of cocain, only those tissues known to be sensitive should be injected. In clean tissue the ¼ per cent. solution seems to be strong enough to produce anæsthesia lasting several hours. In regions where primary union is not necessary, particularly in tissue the seat of inflammatory reaction, the stronger solutions are more satisfactory. In opening of abscesses, for instance, an operation for anal fistula, hemorrhoids, etc., the stronger solutions are the ones of choice.

" We desire particularly to emphasize the value of the anæsthetic in two operations. In operations about the anus it is for us the anæsthetic of choice. In both fistulas and hemorrhoids, any of the radical operations can be performed with the same thoroughness as under a general anæsthetic. The advantage consists in the fact that the duration of the anæsthetic is from seven to ten days, which does away entirely with the after-pain ordinarily attending these operations."

Spinal Anæsthesia.—The general enthusiasm with which spinal anæsthesia was hailed when first introduced only a few years ago has given place to doubts and fears on account of some unpleasant results from its use. After a very favorable report made to the American Proctologic Society, June, 1909, by Dr. Collier F. Martin, of Philadelphia, on " Spinal Anæsthesia in Rectal Surgery," which embraced a series of eighty-seven successful cases, I decided to give Martin's technic in full, until seeing a report of sudden death following spinal

anæsthesia, by Charles B. Reynolds, M.D., of Philadelphia, (*American Journal of Obstetrics and Diseases of Women and Children,* July, 1909).

Reynolds not only reports his fatal cases but gives a full review of the results obtained by such men as Bier, the pioneer worker on spinal anæsthesia, who had one fatal case in over a thousand, where tropococain was used, .13 c.gm. (gr. 2), and others as follows:

W. W. Babcock reports one fatal case in seventy-six, with an injection of alypin .064, adnephrin .00013, water 2 cc.

Urban, one death preceded by delirium and great dyspnœa two days after an injection of one grain of tropococain, in a man thirty-one years of age; operated upon for double inguinal hernia.

Klose and Vogt in a series of experiments with spinal anæsthesia on 103 dogs and rabbits report changes in the cord, showing swelling with a chromatosis of the large motor cells of the anterior and lateral horns.

F. Legueu (Paris) states he had discontinued the use of cocain by the spinal method on account of the danger. As a result of three hundred and fifty operations under stovain, he believes the anæsthesia is insufficient in one-seventh. Cardiac accidents, violent meningeal reaction, persistent paraplegia, and incontinence of urine may ensue in days or months following.

Bruning (Gottingen) has used spinal anæsthesia with stovain, tropococain, or novococain in four hundred and fifty cases; and seen three deaths—paraplegia with ascending pyelonephritis, arrest of respiration with death on the table, and cerebral hemorrhage. He also noticed persistent pain in the back of the legs from one to one and a-half years following the injection.

Reynolds also gives other very interesting data on the subject of spinal anæsthesia, and after such an array of unfavorable reports from high authorities, and in the absence

of any personal experience, it seems to me the use of spinal anæsthesia for rectal surgery cannot be consistently recommended.

General Anæsthesia.—The kind to be used in rectal operations depends upon the nature of the operation and the type of patient.

H. Warren Buckler (*Maryland Medical Journal,* April 11, 1908) says nitrous oxide and oxygen is the safest anæsthetic known, no fatalities having yet been recorded from its use. It would seem that the best subjects for it are those in a greatly debilitated condition from the ravages of disease, or who have some bronchial, pulmonary, renal, or cardiac lesions that would make ether or chloroform anæsthesia unsafe. For such a character of patients and for brief operations, also as a preliminary to ether anæsthesia, I would recommend nitrous oxide and oxygen. More recently S. Griffith Davis, of Baltimore, has been able to hold patients under the influence of nitrous oxide and oxygen for an operation lasting two hours. In the absence of this anæsthetic or the necessary apparatus for administering it, the use of ethol chloride is good, but I do not consider it as safe as the former. (The patients after nitrous oxide and oxygen are more sensitive to pain than those who, following ether anæsthesia, are partly dulled for hours.) Buckler suggests a hypodermic of $\frac{1}{4}$ gr. of morphia just before the gas is administered, for the purpose of anticipating the pain.

This latter practice I have followed for years, giving in addition $\frac{1}{100}$ gr. atropia sulph. and $\frac{1}{30}$ gr. of strychnia, these for the purpose of regulating and sustaining the circulation. My reason for this is, that following all rectal operations where any sewing has to be done the patient suffers great pain. In other cases I would recommend ether, which Buckler thinks is best administered by the vapor method originally devised by Junker and modified by Braun of Leipzig and Gwathney of New York. In brief, this method consists in passing a current of air through a chamber containing a

uniform amount of ether and allowing the vapor thus formed to be inhaled by the patient. By this means the anæsthetizer is able to increase or decrease the strength of the anæsthetic vapor in a perfectly definite proportion by regulating the amount of air and the pressure at which it is driven through the ether. Where there is any contraindication for the use of ether, such as bronchial or renal diseases, we would recommend the use of chloroform by the drop method through an Esmarch inhaler.

CHAPTER III

CONSTIPATION

CONSTIPATION is the delayed evacuation from the bowels of residual matter, delayed, although a sufficient quantity of food may have been taken and properly digested. Class and condition, sex and age are not prohibitive, though among females it is more prevalent because they are so prone to ailments of the generative organs and do not take sufficient exercise. It is not an uncommon condition in infants and is more frequent in old age than in adult life.

I thought it best to give (with the author's permission) a synopsis of Illoway's arrangement and subdivision of this subject, taken from his work on " Constipation in Adults and Children." It is the very best work that has come under the writer's notice, and while it covers a large range of subjects it can be condensed into small space.

While this classification covers all the principal causes leading to this condition, there are minor ones that will be mentioned incidentally.

Etiology.—The many causes may be grouped under four heads:

1. Pathological conditions, within or without the intestinal tract.
2. Abnormalities of form congenital or acquired; dislocations of the large bowel.
3. Foreign bodies in some portion of the bowel.
4. Defective performance of normal physiological function.

But for clinical purposes two groups suffice:

ACUTE CONSTIPATION.
CHRONIC CONSTIPATION.

The terms bear the same significance as when applied to similar conditions in other diseases.

ACUTE CONSTIPATION.—Acute constipation is produced in various ways:

A. By direct obstruction of the lumen of the intestine.
Intussusception.
Volvulus.
Twisting or inversion of the cæcum.
Strangulation by bands or hernias.
Obstruction by foreign bodies.
(*a*) Those introduced from without, whether by mouth or rectum.
(*b*) Those formed within the body.

B. By pathological changes in one or more of the tissues in the intestinal tract as we find,
In acute inflammation of the large or small bowel.
In various forms of peritonitis and in some cases of typhoid fever.

C. By direct inhibition of peristaltic function through the nerve centre.
Acute cerebral meningitis.
Tubercular meningitis of acute form.
Apoplexy.
Acute mania.
Various acute diseases of the spinal cord and its envelopes.
Acute infectious diseases.
Hysteria.

D. By absence of or impairment of the quality of the bile.
Various acute diseases of the liver.
Cholelithiasis during the passage of the gall-stone through the common duct.

E. By inhibition of diaphragmatic and abdominal muscular aid.
Acute diseases of lung and pleura.
Rheumatic diseases of abdominal muscles.

Hyperæsthesia of abdominal parietes.
Paralysis of diaphragm and abdominal muscles.
Acute diseases of the female genital tract.

F. Reflexly.
Inflammation of retained testicle.
Phimosis (Witzenhauser, 1, *Münch. med. Wochschr.,*
May 28, 1907).
Some of the acute diseases of the female genital tract.
Acute diseases of the bladder and prostate.

G. By a combination of·these various ways.
Acute inflammations of the stomach.
Attacks of gout.

CHRONIC CONSTIPATION.—For this study it is best sub-
divided according to the mode of its production in four groups:

A. Chronic constipation produced by well-defined morbid
processes.
B. By obstruction from foreign bodies.
C. By congenital malformation of a·section of the large
bowel or its mesentery.
D. From impairment of physiological functioning.

A further subdivision may be:

A. CHRONIC CONSTIPATION FROM DISEASE

I. By obstructing the lumen of the tube:
Hypertrophy, or thickening of Houston's valves.
Cicatricial narrowing.
Constriction of the intestinal tract by bands.
Cancerous disease of the large bowel.
Tumors in the abdominal cavity pressing upon the
bowel.
Massive exudations of blood or of serum in the cel-
lular tissue of the pelvis.
Obstruction of the rectum by a retroverted uterus.
Tumors within the rectum.
The third degree of prolapse of the rectum.

II. By impairment of the secretions poured into the intestines:

Chronic liver disease when secretion of bile is deficient in quantity and quality.

Disease of the pancreas.

III. By inhibition of peristalsis through the nerve centres:

Chronic diseases of the brain.

Chronic affections of spinal cord and its envelopes.

Chronic forms of insanity.

Saturnine intoxication.

Tabes dorsalis (locomotor ataxia).

Paralysis after diphtheria.

IV. By chronic venous congestion of the intestinal circulation.

Organic heart disease.

Some chronic pulmonary affection, asthma, emphysema, etc.

V. By voluntary abstention from stool on account of pain caused by reason of a diseased condition of the rectum:

Hemorrhoids.

Ulcers of the rectum.

Fissure of the anus.

Chronic proctitis.

Irritable and hysterical rectum.

VI. By changes in the mucous membrane which impair its irritability and interfere with its physiological function:

Chronic catarrh of the small intestines, whilst diarrhœa is a prominent feature of catarrh of the large bowel.

Membranous enteritis.

Atrophy of a section or sections of the intestinal mucous membrane (after catarrhs).

VII. By atony of the intestinal muscle produced by morbid
conditions of the stomach or of the bowels:
Atony of the stomach.
Dilatation of the stomach.
As a sequence of prolonged catarrh of the large
bowel.

B. CHRONIC CONSTIPATION FROM FOREIGN BODIES

Foreign bodies which give rise to chronic constipation are
such as are of gradual growth, whether the materials of which
they are formed are excretions or abnormal formations of the
body, or are introduced from without.

C. CHRONIC CONSTIPATION PRODUCED BY MALFORMATIONS OF THE INTESTINES

Malformations of the intestines are most varied and may
involve any part thereof. Those that are compatible with a
more or less prolonged existence and that give rise to a state
of chronic constipation are, so far as reported: (1) abnor-
mally developed colon; (2) undue length or size of sigmoid
flexure; (3) diverticula of the large bowel; (4) diaphragms
in the large bowel.

B. ESSENTIAL PRIMARY ATROPHY OF THE LARGE BOWEL.
—Congenital arrest of development of the muscular apparatus
of the bowel.

C. DISLOCATION OF THE BOWELS—ENTEROPTOSIS.—The
most common form of dislocation is downward—enteroptosis.
The parts of the intestinal tract most subject to this form of
dislocation are the stomach, transverse colon, and sigmoid.

D. CHRONIC CONSTIPATION FROM IMPAIRED PHYSIOLOGICAL FUNCTION

By impairment of physiological function we understand
two very different conditions, namely, (1) perverted action;
(2) imperfect performance of physiological function. It is
only to this category of constipation, and more particularly

to the last subdivision thereof, that the term *habitual constipation* can be properly applied, for it is only under such conditions that a person may be constipated for a long time and still retain a fair condition of health.

Constipation from Perverted Action: Spastic Constipation. —1. ENTEROSPASM occurs when the normal physiological order of contraction of the circular and longitudinal muscular fibres is perverted and the contraction of both coats takes place synchronously and spasmodically. This contraction may be general or partial; the latter is more frequent and generally located in the large bowel. Enterospasm occurs most frequently in gastric and intestinal indigestions.

2. ENTEROSPASM AND ATONY.

3. SPASMODIC STRICTURE OF THE RECTUM.—A spasmodic contraction of the rectum with obstinate constipation has been described. According to O'Beirne it is the uppermost part of the rectum that is usually the seat of the stricture. It is exceedingly rare and occurs as a partial enterospasm in hysterical and neurasthenic states, or under the influence of certain pathological conditions.

4. SPASMODIC OR IRRITABLE SPHINCTER (WITHOUT FISSURE).—This is much more frequent than the same condition in the rectum; it is a partial enterospasm occurring also in hysteria and neurasthenia. It may depend upon an enlarged prostatic gland or an inflammatory condition of the prostate. In females it may be present in chronic conditions of the genital organs. It is attended with irritability of the bladder.

Imperfect Performance of Physiological Function.—ATONY OF THE INTESTINE, CAUSES, AND THEIR MODE OF ACTION.— By far the greatest number of cases of constipation that come under our observation are due to imperfect performance of physiological function, more particularly of the large bowel. Atony not only implies the loss of muscular force but also a loss of normal irritability. As a result of this atony and consequent diminution of its irritability the large bowel is unable to expel its residual matter properly and constipation results.

Judging by analogy from what we see in the salivary gland, it may be assumed that this loss of muscular power may also result in a diminution in the action of the muciparous glands, lessen the amount of mucus secreted and thus retard the passage of the fecal matter, causing it to be dry and hard. The causes that lead to such impairment are:

1. *Neglect.*—Neglect to attend to the calls of nature recurring daily for a considerable time results in the establishment of a toleration on the part of the mucous membrane and the terminal afferent nerve filaments, and thus the bowel becomes habituated to the presence of extraneous matters which should have been discharged as soon as they reached the rectum in any quantity.

2. *Reading at Stool.*—By this pernicious habit the inhibiting influence of the will is directed from the spinal centre controlling the sphincter; the latter remains in its normal state of contraction, and thus the fecal matter is not extruded. The controlling influence of the mind over the functions of the rectum is well illustrated by what frequently happens to us all, namely, when nature calls us to evacuate the bowel some work or subject of great interest will arise to divert us, when almost immediately the desire ceases.

3. *Food Defective in Residual Matter.*—A certain amount of residual matter, such as coarse vegetable fibre, is not only necessary for the excitation of the peristalsis of the large bowel, but also prevents the fecal matter from packing in hard masses by the readiness with which it absorbs and retains the fluids. This is a very important fact to be borne in mind in the treatment of chronic constipation, especially now that our foodstuffs have been so refined by the improved machinery of the present day. This factor as the cause in the production of constipation has been very much enhanced by the present custom, so common, of living upon prepared concentrated foods. As an offset to this custom, fruit should be eaten with their skins, when edible, as apples, peaches, plums, etc. Our flour and meal should not be so thoroughly bolted, and we

should eat more freely of vegetables that contain a large proportion of coarse fibrous tissue, such as cabbage, cauliflower, turnips, etc. By following these rules, our food not being so concentrated we will have to eat a larger quantity in order to obtain the requisite amount of nourishment.

Food Deficient in Fats.—A very important fact that should constantly be borne in mind is that fats are not indigestible in proper proportions to persons whose digestion is normal, and that they are very important constituents of the fecal matter, tending to keep it soft.

4. *Abstaining from Cold Water.*—This habit is frequently formed through ignorance of the good effect of cold in stimulating the circulation, the nerve filaments, and the muscular coats of the stomach and intestines. Warm solutions, on the contrary, produce turgidity of the circulation of the intestinal tract, obtund the normal sensibility of its nerve filaments, and relax its muscular tissues. Added to these objections the warm solutions habitually taken are decoctions containing astringent and other deleterious properties, such as tea and coffee.

5. *Want of Sufficient Physical Exercise.*—Exercise is known to stimulate all the physiological processes going on within the organism, few if any less so than the functions of the rectum and sigmoid. The circulation is hastened, the respiration is accelerated, the destructive metamorphosis of the tissues becomes more rapid, the appetite is increased, and the muscular structures are invigorated. Few appreciate the benefits to be derived from exercise in obviating or overcoming constipation. We have seen cases entirely relieved by this measure alone.

6. *Muscular Weakness of the Abdominal Walls.*—This is generally due to the neglect of proper measures after parturition, or more rarely to some defect of muscular development. The pendulous belly is not only the cause of constipation but produces a form of it that is most difficult to overcome.

7. *Obesity.*

8. *Prolonged Mental Work; Prolonged Mental Worry; General Depressing Influences.*

9. *Bad Teeth or Want of Teeth.*—This results in imperfect mastication and dyspepsia.

10. *Old Age.*—The general debility incident to old age, the torpidity of the secreting organs, and the inability to exercise are frequent causes.

11. *Warm Water by Injections and the Habit of Taking Purgative Medicine.*—The prolonged use of warm injections causes turgescence of the parts, relaxes the action of the muscles, and dulls the normal irritability of the nerves. The relaxation of the muscles is also brought about by the over-distention due to the quantity of warm water generally necessary to accomplish the desired results.

12. *Incidental Causes.*—Inadvertent constipation is caused by certain derivatives of the mineral kingdom which tend to dry up the secretions of the bowel and harden the fæces (Birch, " Constipated Bowel," 1868). These substances are alum, the salts of lime, the salts of lead, iron, and copper, which are taken in our food as adulterants, coloring matter in candies, and copper in pickles.

SYMPTOMS.—The usual symptoms of constipation are so familiar as not to need any very careful enumeration, yet there are some unusual cases which are not known to the average physician.

Usual Symptoms.—The tongue is coated, there is offensive breath, headache, loss of appetite, irritability of temper, hebetude, general feeling of malaise, and moroseness.

Local Symptoms.—Distention, heaviness in the belly, flatulency, rumbling noises in the bowels, pain in the sides or back under the liver or the inferior angle of the left scapula, sometimes itching at the anus; the fæces are hard and dry.

Unusual Symptoms.—Unusual symptoms are vertigo and a hypochondriacal condition. Illoway reports a case of pro-

found stupor, which lasted three weeks, owing to prolonged constipation due to an anal fissure.

ETIOLOGY OF THE SYMPTOMS.—Senator holds that the symptoms are due to intoxication by sulphuretted hydrogen gas. This is denied by most authorities. Rosenheim contends they are caused by augmented putrefaction in the albuminoids. This view presents many obstacles. Illoway's opinion is that they are based upon the disturbances of the nervous, circulatory, and glandular systems of the intestinal tract, due to the pressure exerted by the hardened masses. Constipation may also interfere with the diffusion of CO_2, and its consequent accumulation in the blood may contribute to the production of the perturbations.

DIAGNOSIS.—As a rule the diagnosis is easily made from the statement of the patient and the history of the case. These, however, cannot always be relied upon. Many times while the patient may have had daily evacuations they have been insufficient, and a large portion of the fecal matter that should have come away is left behind to become harder and drier. At other times (this is a very deceptive condition), the patient may have frequent watery stools which may even be involuntary, with tenesmus and bearing down. If this is accompanied with a history of previous constipation, the case may almost be diagnosed by the symptoms, but it is always best to make a digital examination, which will readily confirm the condition.

One of the chief points in the diagnosis of constipation is to establish at the outset, if possible, whether it is an idiopathic condition or due to one of the many indirect pathological processes already alluded to in the first part of this chapter.

In addition to the digital examination of the rectum as a means for diagnosing constipation, auscultation over the descending colon and sigmoid can also be used with great advantage. In the digital examination of the rectum, besides being able to ascertain the existence of scybalous masses, the examiner should feel for a stricture, polypi, obstructions by displacement of enlarged adjoining organs and other growths,

and should look for the presence of a fissure or hemorrhoids as active causes in the production of constipation.

If the digital examination fails to indicate a satisfactory cause, let the rectum be washed out by an enema and the pneumatic proctoscope used for a high examination, including the sigmoid. The same obstructions should be looked for high up as already enumerated in making the low examination. In addition the condition of Houston's valves should be carefully inspected, to ascertain what, if any, obstruction they may offer to the passage of the fæces. As an additional aid to the diagnosis of obstructions high up in the bowel, resort may be had to the careful inflation of the bowel by carbonic acid gas or ordinary air pumped into the bowel by means of a double bulb, with a nozzle attached to the end of its tubing. With the bowel inflated we may, by percussion, easily locate foreign bodies, tumors, indurations, and strictures high up.

In making the proctoscopic examination of the rectum, all local pathological conditions likely to produce constipation, such as chronic catarrh, atony accompanied by relaxation of the intestinal walls, etc., should be noted.

PROGNOSIS.—" It is not at all a question as to life." Life is not endangered by constipation, with few exceptions, as in ileus paralyticus, and Illoway relates a case of death from asthenia which followed apparent recovery from prolonged and obstinate constipation. Recovery as a rule is favorable, even in those cases in which there is dilatation or even hypertrophy of the bowel when properly managed. The exceptions to the rule are: I. Where there is a marked and prolonged dislocation of the bowel; II. Where the abdominal walls are very flabby and relaxed; III. In old people where there is not only atony but degeneration, the existence of any of these makes the prognosis unfavorable.

The Consequence of Constipation.—The three prominent and constant functional disorders that always result from constipation are an inhibition of peristalsis, an accumulation and hardening of fæces, and an obstruction to the circulation of

the rectum and sigmoid which results in turgescence and congestion.

Among the pathological conditions resulting from constipation may be mentioned *hemorrhoids, anal fissure, typhlitis,* due to the distention of the cæcum by fecal matter, and its consequences; a certain number of cases of *appendicitis,* as in a large percentage of such cases fecal concretions are found in the appendix; *membranous enteritis, sigmoiditis, prostatitis, enteroliths, dilatation,* which may be general, involving the whole of the large bowel from the cæcum to the anus, or limited, affecting any section thereof; *ulceration, diverticulitis, hernia,* as a result of violent straining at stool to overcome constipation; *diarrhœa* with constipation and *intestinal obstruction, auto-intoxication.* While this has generally been accredited as one of the results of constipation, Illoway opposes the idea for the very good reasons that the symptoms, such as headache, anorexia, and the insomnia of the constipated, which are supposed by some to be due to intoxication, are too promptly relieved by a thorough purgation for this to be the cause, and also from the fact that in cases where there have been large accumulations of fæces for a long time the symptoms of auto-intoxication do not exist, which they should do in a marked degree if resulting from constipation. Illoway in further proof of this assertion quotes Bouchard, who says: " The objection often raised to the hypothesis of auto-intoxication of fecal origin is the fact that constipation is compatible with good health. If the hypothesis were true, auto-intoxication should be realized in its highest degree in the constipated. I answer that constipation must be regarded as a protection against auto-intoxication. It presumes that all that can be absorbed has been absorbed." There is, however, danger of intoxication when we have a diarrhœa established with the constipation, because the fluid fecal matter, which in this instance comes from the small intestine, is not discharged rapidly enough on account of the accumulation of hardened fæces in the large bowel.

Treatment.—I consider first treatment of the idiopathic form of constipation, the most common form of which is due to:

Atony of the Intestinal Musculature.— The two necessary requirements for consideration are: I. Removal of the cause; II. Restoration of the muscular tone.

FIRST REQUIREMENT.—Removal can generally be accomplished by a scrupulous regularity in responding to the calls of nature and a punctilious observance of a fixed time for going to the toilet, whether the inclination exists or not. In the event of failure, after reaching the toilet, it should be induced by the action of some local stimulant, the best of which is a cold-water enema.

Diet.—The effect of diet in preventing or overcoming constipation cannot be too strongly urged, nor do we think the part it plays is half appreciated by either professionals or laity. When it is remembered that fully nine-tenths of the fecal discharges are made up of the indigestible constituents, the excess of those that are digestible, and the offal of our food, it will be readily seen from the recent great advances in the preparation of food that there is little of the indigestible or offal left, so that by these refinements of civilization constipation is induced, both by the concentration and the refined character of the food. In order to prevent the nitrogenous portion of our food from packing or from forming hard and scybalous masses, which it is inclined to do, it should be taken in connection with a large amount of vegetables and fruit which contain a considerable amount of cellulose, this being almost entirely indigestible in the intestinal tract of man, except to a limited extent by the micro-organisms which it meets with in the large intestine and which are capable of breaking up cellulose to a limited extent. Consequently this constituent furnishes a liberal amount of indigestible material which separates the nitrogenous waste matters, acts as a sponge to retain the water, and furnishes a mechanical irritant for stimulating the afferent nerves of the intestinal mucosa.

Therefore our food should consist of a liberal amount of coarse vegetables, fruits with their peels, properly prepared, cereals, and breadstuffs with their husks.

Drink.—The effect of fluids in preventing or overcoming constipation is as great as that of diet. The great importance of fluid to the animal economy is well recognized, and its mechanical effect in keeping the fecal matter moist and soft can be readily conjectured. The chief question in this connection is in what condition (cold or warm) is it best taken? It is well known that cold water stimulates intestinal peristalsis and gives tone to its musculature, while warm water relaxes its musculature and blunts its sensibilities. Therefore for the purpose of overcoming constipation water should be taken cold, and in order to keep the fecal matter moist it should be taken in large quantities, best when the stomach is empty so as not to interfere with digestion by diluting the digestive fluids.

Exercise.—This also has an important bearing in the regulation of this function. A long brisk walk, a ride on a bicycle or on horseback, either of which should be sufficiently active to stimulate the circulation and produce free action of the skin, are the best means of taking it. When unable to get it in either of these forms, calisthenic exercises or " The Whitely Pulley Method " may be substituted, and should be taken on a porch or in a cool, well-ventilated room.

SECOND REQUIREMENT.—The restoration of the muscular tone can best be done in the majority of cases by mechanical methods, although a tonic, with gently stimulating therapy, must not be entirely ignored, especially in early treatment when every possible means will be necessary to restore the function even to a partial performance of its duty. These measures may be divided into mechanical and therapeutic means.

MECHANICAL.—I. Massage; II. Hydrotherapy; III. Electricity.

Massage.—This has been found of the greatest benefit in the treatment of habitual constipation, and is best adapted to

those cases of prostration and extreme weakness in which the patients are unable to take a regular amount of active exercise; but do not let it ever take the place of active exercise except under these conditions. Hazzard, in a paper read before the American Proctologic Society, at Atlantic City, June, 1909, spoke of that form of constipation which resists and defies laxatives, purgation, corrected diet or special diet, walking, horseback riding, or any form of gymnastics. There are certainly many such instances. All of the mentioned remedies are useful, although only palliative, failing to completely empty the tube, and directly the patient ceases to follow the regimen suggested, which he will soon do, he relapses into the same condition as before. Hence the necessity for a better method, which is, in my opinion, abdominal massage.

There are five generally accepted movements in massage: Friction, rolling, compression, kneading, and percussion. In treating the abdominal organs, including the nerves, lymph-spaces, juice canals, vessels of all kinds, as well as the accumulations which may be there, any (or better all) of these movements should be combined, although friction and percussion are of doubtful utility. The main points which would seem to deserve the most consideration are: Firmness combined with gentleness, persistence, the slow breaking up and displacement of any retained fæces wherever found, and the compression of every gland concerned with digestion and assimilation. A few points which I have learned through experience are these:

First, to clear out the rectum by enemata if anything be in it, as no amount of massage affects the rectum except it be done in the fossa, and this does not amount to much.

Second, to *always* begin with the descending colon and as much of the sigmoid as may be reached (bearing in mind possible malformation and redundancies of the sigmoid); then at subsequent visits taking the other parts in the order of their anatomical position. A poor way to evacuate a sausage is to begin pushing upon its contents at the proximal end. A vast

amount of damage may result from general massage of the abdomen at the beginning of the treatment. Lakes of liquefied fæces may be and will be created which cannot find exit and are only rendered the more absorbable. I have seen headache, high temperature, and severe muscular pains result from non-observance of this rule.

The third point is, to use gentleness at the first treatment. The patient always has some soreness following the first few treatments, and is very apt to discontinue the matter altogether if the masseur is too rough. More vigorous movements may be resorted to after confidence is gained. The first few treatments should upon no account be delegated to another, not even to a trained nurse, as unskilled manœuvres are most apt to prove worthless or, what is worse, harmful. If the first manipulations are not done by the surgeon, personally, they had best be left off altogether. Some of the contraindications for its use are atheroma and aneurisms.

Massage acts by stimulating the circulation and the lymphatic vessels, by the absorption of effete products, and by improving the general muscular tone.

Hydrotherapy.—Under the head of hydrotherapy for the relief of constipation due to atony may be mentioned the following measures:

C l y s t e r s ,   C o l d   T u b   B a t h s ,   C o l d   C o m -
p r e s s e s , Co l d   M o i s t   F r i c t i o n .—Of these various measures I speak here at length only of the following:

C l y s t e r s .—As rectal injections are so generally used for habitual constipation, I mention abuses of the method and give the proper directions for their application.

What has been said previously of the effects of cold and warm water, when taken by mouth on the intestinal tract is applicable when administered by enema and has the same effect on the general muscular tone and peristalsis of the rectum. The warm water relaxes the muscular coats of the rectum and obtunds the sensory nerve endings, consequently the use of warm-water enemas can only act temporarily by overdistention

of the rectal walls, which leaves them in a more relaxed condition and in turn increases the constipation. The practice of flushing out the bowel with large quantities of warm water, so generally recommended by quacks in order to advertise their fountain syringes, is therefore most pernicious.

On the other hand, the use of cold-water enemas is a most useful and satisfactory method of stimulating rectal peristalsis and making the rectum do its own work. This may be done frequently, only as a reserve force, to stimulate the rectum at the appointed time when other means may have failed, and leaves the bowel each time that it is used in a better condition by its general tonic effect and by having made the bowel perform its own function. The small quantity of water necessary for this purpose does not distend the bowel unduly and improves its muscular tone. There need be no fear of any deleterious effect to the adjoining organs from the cold water used, except possibly during menstruation. The fountain syringe is the most convenient instrument.

P o s i t i o n .—Where it is only necessary to use a small quantity of cold water for the purpose of stimulating the bowel to action the horizontal position will answer the purpose, but in cases where constipation has continued for several days, and you wish to stimulate both rectum and sigmoid to action, then it is very important for the patient to be placed in the knee-chest position, or if too feeble to assume such a position, the same results to a less degree may be obtained by placing him in the left lateral position, with a pillow under the hips to elevate them above the shoulders and head. In either of these positions, with a short nozzle, a high enema can be given under all conditions, even though the impaction may be extensive, as by elevating the bag of the syringe sufficient pressure may be obtained to distend the bowel enough to allow the water to pass around and above the obstruction.

C o l d   C o m p r e s s e s   a n d   C o l d   M o i s t   F r i c -
t i o n s .—Both may be used very satisfactorily, by stimulating the bowel reflexly to do its own work.

Electricity.—That the rectum may be stimulated to activity by an electrical current is generally conceded, and the continued and frequent use of it may overcome permanently the constipation due to atony has been confidently affirmed by Dr. Dwight Murray in his article on " A Rational Treatment of Chronic Constipation " (*New York Medical Journal,* Nov. 3, 1906), and others. Murray's technic for the use of this remedy is as follows:

" The patient is placed in the Sims position, an electrode, after the pattern of Ewald with a perforated soft-rubber shield, is passed into the sigmoid. The rectal electrode is connected from its binding post to the positive pole of the battery, and rubber tubing connects it also with an irrigator, filled with normal saline solution, which is elevated about three and a half feet above the patient. The rapidity of the flow of normal saline is controlled by a stop-cock in the electrode. The negative electrode is made of sheet lead, large enough to cover the abdomen, and is well padded with a towel wrung out of hot normal saline solution. The electric saline douche washes all fecal débris and mucus from the intestinal mucosa, leaving a clean surface for medication, which is of the utmost importance in the treatment. It enables us to apply medicinal agents to the mucous surfaces without the interposition of the almost impermeable coating which the secretion constitutes.

" The effect on the mucous membrane, and on the intestinal and the abdominal muscles, of the galvanic current applied in this manner seems to be soothing and quieting to the chronic inflammation. The relief of the inflamed condition leaves the muscles free to act, lessening what may be termed muscular fear. My patients tell me that they have better power of expulsion than before the treatment was begun. The normal saline solution in the irrigator is kept at 110° F., and is turned on just before the electric current is started. The amount of electricity used varies from five to twenty-five milliampères, according to different physical conditions.

" When the first part of the treatment is finished the abdominal skin is well reddened, and feels as though a mustard plaster had been applied. No electricity reaches the tissues, except as the connection is made by the normal saline solution slowly running through the electrode into the sigmoid flexure. This makes an electrode of all parts of the colon which the solution reaches, without discomfort to or danger of burning the patient. This part of the treatment occupies from ten to twelve minutes, and from thirty-two to sixty-four ounces of normal saline solution is thrown into the sigmoid and descending colon. The patient is then allowed to go to the toilet, where a free evacuation takes place, leaving the intestinal mucosa clean.

" He then returns to the table for the last half of the treatment. This consists in throwing one ounce of an emulsion of olive oil, 1 pint; iodoform, 1 drachm; bismuth subnitrate, 2 ounces (as advised by J. M. Mathews for disease of the sigmoid), into the descending colon through a Wales bougie or a special tube which I have devised. This is followed by one or two ounces of some dilute astringent or antiseptic solution or hydrastis. The iodoform is omitted from the emulsion if the patient has an idiosyncrasy that would make its use inadvisable, but I find they do better when using it. After throwing the medicament into the sigmoid, the patient is kept for about ten minutes on the table, so tipped that the hips are elevated considerably, allowing the emulsion to gravitate high up in the colon. The treatment is given every fourth day until patients have daily normal stools without help, after which the time between treatments is lengthened until the patients are wholly on their own resources. The successful practise of this method involves the expenditure of much time, each treatment occupying approximately one hour.

" When this treatment is begun, patients are ordered to stop the use of all laxatives. They are instructed to go to the toilet at a regular hour each day and make an honest effort to stool, taking fifteen or twenty minutes, if necessary, using

gentle pressure, but never to strain. Failing in this, the use of an enema of plain water, or normal saline, is directed in order that the bowel may be educated to empty itself at a regular time. While under this treatment patients are allowed liberal diet. Excess of pastry, confections, and condiments is prohibited, and they are directed to drink at least six glasses of water daily.

" As to results of my method, I find that daily stools follow the first treatment in many cases, others after only a few treatments. Comparatively few cases are unsuccessful in obtaining a daily stool, and even these show manifest improvement in their general condition. My records show that 75 per cent. of the cases are cured, while nearly all of the other 25 per cent. are improved. Although each patient is asked to give a year to the treatment, only one has thus far taken treatments for so long a time.

" It would tax your patience to go into detail by the report of cases. Some have been little short of miraculous in results obtained. Four and a half years is the oldest cured case I have, a time-test sufficiently long to prove the value of what seems to me rational treatment of chronic colitis, which is the real pathological condition in chronic constipation.

" Some explanation of my reason for employing the treatment may be of interest. The oil soothes and lubricates, iodoform acts as an alterative and antiseptic, while bismuth has a healing effect on all diseased and ulcerated surfaces. These are applied directly to the surface of the mucous membrane. Astringent and other solutions used to follow the emulsion have their effect locally, according to the kind used and the effect desired."

Therapeutic Treatment.—The use of laxative medicines is nearly always called for, for the immediate relief of both acute and chronic constipation, and also to supplement and assist other forms of treatment. These should be mild in character, such as preparations of cascara sagrada and senna, in moderate doses, to be omitted as soon as possible.

Operative Treatment.—It should be a rule, to be always borne in mind, in the treatment of constipation, to remove all decided obstructions to the passage of fecal matter, whenever practicable. This would include hemorrhoids, polypi, narrowing of the lumen by stricture, and the division of Houston's valves, when they offer sufficient resistance to the passage of fecal matter to obstruct its exit.

The first three of these obstructions will be considered under their respective headings. As the latter is only done for the relief of the obstructive form of constipation and this is the proper place for its consideration.

Thomas Charles Martin, of Washington, D. C., was the first to suggest this operation (*valvotomy*) for the relief of obstipation. The need for the operation in a given case of constipation is ascertained by testing the resistance of the valve by a blunt hook. Whereas they offer little or no resistance to being drawn down by the blunt hook in their normal condition, the resistance is considerable when the valve is infiltrated with fibrous tissue, as a result of chronic interstitial inflammation. His technic for the operation is as follows: The bowel should first be thoroughly evacuated and then irrigated with antiseptic solution. The patient is placed in the knee-chest position, and a tubular speculum of 30 mm. diameter is introduced up to the projecting valve (Fig. 27). The valve to be divided is then fixed by two long hook-shaped tenacula, which are made to transfix the valve from above, to the right and left of its centre, the space between them being where the incision is to be made. The depth to which the valve should be divided is determined by the point at which a uterine sound, curved to three-quarters of a circle, is arrested when introduced above the valve and pulled downward. The distance between this and the free border of the valve is the depth to which the incision should be made. The knife, the tenacula, and the hook all have long handles; the knives have two varieties of blades, one a curved, sharp-pointed bistoury, the other a scalpel. They have all been devised by Martin and are

shown in Fig. 28. The transfixion should be made when the valve is at right angles to the intestinal wall, and not when it is drawn down. To avoid pulling the valve down in this procedure, Martin advises the use of proctoscopes of different lengths, so that they will just reach and bolster up the valve.
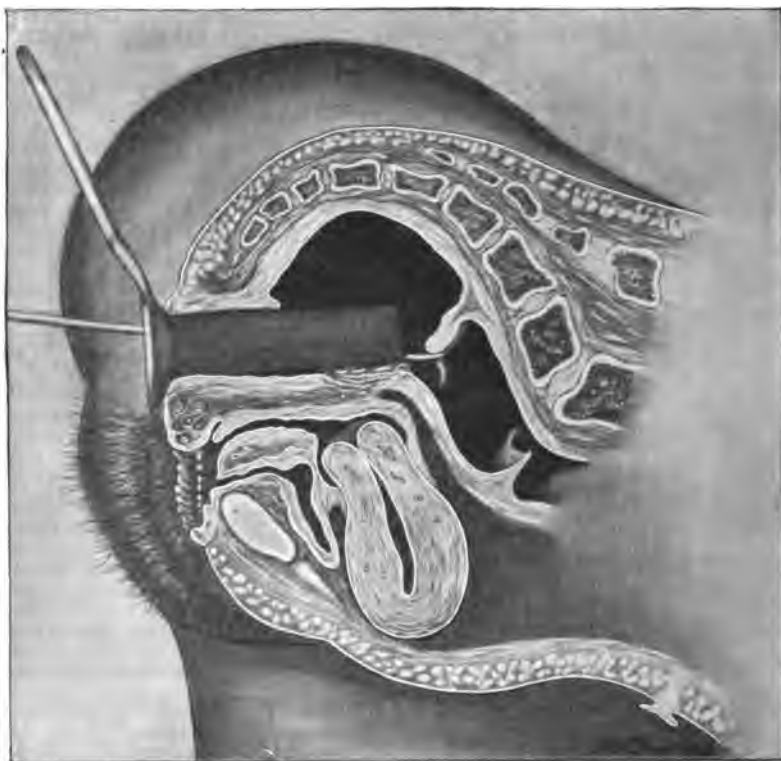
FIG. 27.—Testing resistance of valve with Martin's hook. (From Hemmeter's Dis. of the Intestines.)

The first incision, which is very shallow, is made with the curved sharp-pointed bistoury, and this incision is carried to the required depth by the scalpel. If much hemorrhage results, he advises suturing the cut edges of the mucous membrane together, for which he has devised some ingenious instruments

for introducing the sutures. His subsequent treatment con-
sists in the daily inspection of the divided valves, with such
local treatment to them as may suggest itself to the operator.

J. Rawson Pennington, of Chicago, Illinois, says: "After
having one case of peritonitis and another in which there was
a severe hemorrhage following the operation as above de-
scribed, I devised a clip and an instrument for applying the
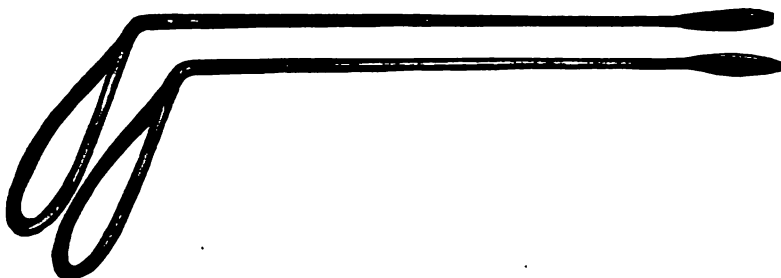
FIG. 28.—Martin's over and under valvotomy scalpels. But one knife is necessary if it be
provided with a reversible handle. (From Hemmeter's Dis. of the Intestines.)
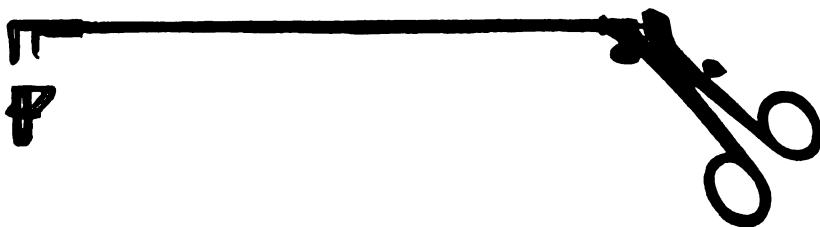
FIG. 29.—Pennington's clip for cutting rectal valves and the instrument for
applying it. (Tuttle.)

same (Fig. 29) to the valve, which severs or cuts out an
elliptical piece from the free border of the valve by pressure
necrosis. The clip and instrument are passed into the rectum
through a tubular speculum (Fig. 30). This method of
cutting through the valve is not attended with hemorrhage or
the risk of peritonitis, while it accomplishes similar results to
the cutting operation devised by Martin. Both Martin and
Pennington, as well as others, report a number of cases of
constipation that have been absolutely cured by these methods.

Jerome M. Lynch has recently devised a long-stemmed angio-tribe (Fig. 31) with which to take V-shaped pieces out of the valve. The author thinks it is far preferable to the clip, as one or more pieces can be taken out of the same valve or several valves at the same sitting without any risk of hemorrhage or any other bad results.

I do not doubt the efficacy of such methods of treatment, provided the constipation is due to obstruction by the too-
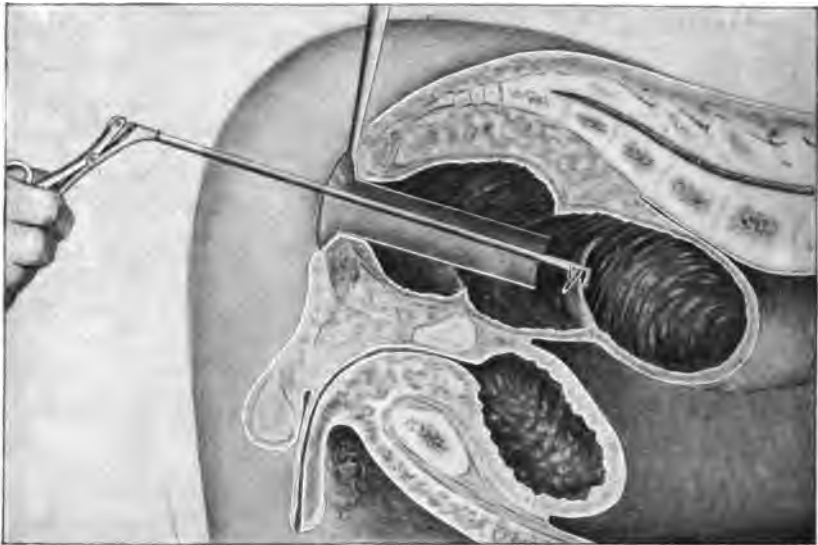
FIG. 30.—Pennington's clip applied. (Tuttle.)

resistant valves; but I am, however, of opinion that such cause of constipation is not nearly so frequent as has been supposed.

The treatment of those cases of constipation due to indirect causes should be considered in connection with the primary disease.

IMPACTION.—Cases of fecal impaction, where there are large, hard and dry scybalous masses, often attended with an oozing of fluid fecal matter, due to irritation set up in the rectal walls by the hard masses, produces œdema of the parts, and

results in excessive secretion of a thin watery mucus, which dissolves a small amount of fecal matter from the surface of the scybalous masses and accounts for the fluid stools. Very misleading and suggestive of diarrhœa, it should always suggest a digital examination, which will immediately reveal the true condition. It is always best to break up scybalous masses immediately, as far as possible with the finger, which is better than any instrument, being far less liable to injure the bowel. Let this be followed first by an injection of from one to two ounces of hydrogen peroxide, which has the property of dissolving the fecal masses very promptly—a suggestion first
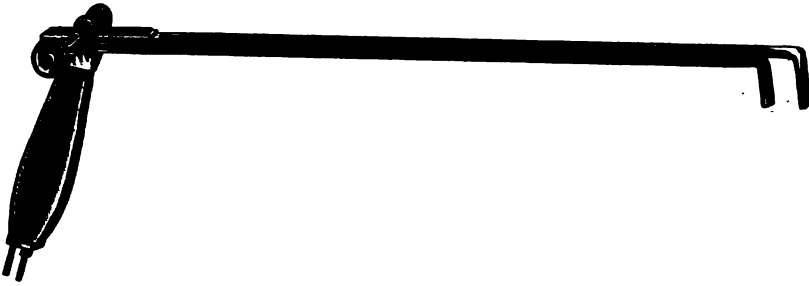
Fig. 31.—Lynch's electric angiotribe.

offered, we believe, by A. B. Cooke, of Nashville, Tennessee. Repeat this every three or four hours, until all the fecal masses are dissolved, which can only be known by a digital examination. If the peroxide of hydrogen does not excite sufficient irritation to cause the bowel to expel its contents, then a large enema of warm soapsuds, with cotton-seed oil, may be administered in the knee-chest position.

To insure complete emptying of the colon and even of the cæcum, nearly always loaded in these cases, castor oil in one-ounce doses, or compound licorice powder in two dram doses, should be given every four hours, until several large and soft evacuations are brought away.

In obstinate cases of constipation where not any of the above causes exist to account for the constipation, and where the constitutional symptoms from the absorption of effete

6

products are sufficient to warrant it, an abdominal section should be made in order to ascertain the length of the sigmoid and its meson, with its probable bearing on the constipation.

The abnormally long sigmoid (together with the acute angulation that results from it) has been generally recognized in recent years by writers as a very important and frequent factor in the production of constipation. For the correction of this defect there have been several remedies suggested. The first, which was the most rational, was to straighten the sigmoid and fix it by attaching it to the abdominal parietes; this is known as sigmoidopexy, the technic for the performance of which is described under the treatment for third degree of prolapse of the rectum. An objection to this method has been pointed out by J. G. Clark, of the University of Pennsylvania, on the ground that " it is a wrong principle to attach a movable organ, where it can be avoided," and he suggests as a substitute " lateral anastomosis between the two extremes of the sigmoid loop at the point where they most nearly approximate each other (Fig. 32) in cases where the redundancy of the sigmoid is not sufficient to justify resection (as in Chapter XXI on Congenital Idiopathic Dilatation of the Colon, Hirschsprung's Disease), and is producing very exaggerated constipation."

While lateral anastomosis is the more difficult operation to perform, yet it meets the abnormal conditions more effectually with the least violence to the normal condition of motility in the sigmoid. Clark supports this suggestion by the report of a case in which a very aggravated form of constipation, attended with profound toxic symptoms, was permanently relieved by such a procedure.

PSYCHOTHERAPY.—The treatment of constipation would be incomplete without some reference to the very satisfactory results obtained from psychotherapy by Irving Phillips Lyon of Buffalo, N. Y., Curtis F. Burnam of Baltimore, and others. Here I quote at length from a paper read by Dr. Lyon before the Congress of American Physicians, Transactions of the

American Physicians, 1908. He is of the opinion that many
of the contributary causes of constipation are merely secondary
to the neglect of training the bowels to functional regularity,
and says further (I quote verbatim) :

" *The Final Cause of Habit Constipation is Habit.*—This
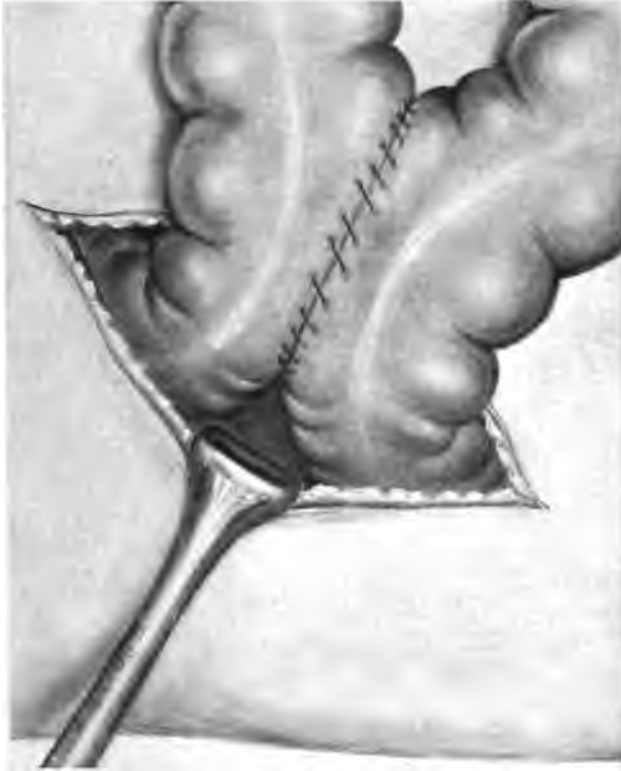
Fig. 32.—J. G. Clarke's lateral anastomosis.

habit involves both the mentality and the special nerves of
function of the intestine. The latter are encouraged in their
loss of control or of spontaneous action indirectly by the
mental habit of conviction of necessary local disturbance in
the intestines. So long as the mind of the patient continues to

be misinformed as to the real cause of the functional disturbance, tinkering with the minor agents of relief is likely to prove ineffectual in inducing a radical cure, although such a cure may occasionally be induced by any method of treatment that includes strong suggestive authority by the physician and systematic fixing of a regular time for the act of defecation. Such cures only prove the rule of causation herein urged. This view of causation, if correct, suggests naturally the proper method of treatment.

" METHOD OF TREATMENT.—*Psychotherapy, Training in Habit, and Accessory Stimuli.*—In treating habit constipation, the force of habit must be recognized and combated. All habits have a certain mental equivalent or representation. The habit of constipation is no exception. In a sense it seems to be a functional disturbance related to a psychoneurosis, a psychoneurosis of function. However obscure and ill-defined the mental representation may appear in theory, in practice, at any rate, it becomes evident.

" If, in practice, a strong vigorous man of fifty-two applies to a physician for the relief of chronic constipation that has persisted from earliest childhood without interruption, without once in fifty years permitting natural spontaneous defecation without cathartics, and if this man is so far influenced in his mentality regarding his fixed habit of constipation by a single interview with the physician, without drugs, without change of diet, without any chemical or physical agents whatever, but merely by conversation, so as to be cured over-night and thereafter permanently through the next year, is there any doubt that the constipation has a representation in the mind of the patient, is, in fact, a pure psychoneurosis of function? If somewhat similar experiences are repeated many times, not only in men in robust health, but also in bed-ridden neurasthenic women, cured permanently by conversation alone and promptly over-night or in the course of a few days, can one deny in such instances the existence of a psychological equivalent of constipation? Such experiences have occurred repeat-

edly in my practice, exactly as represented in the hypothetical cases. I cannot doubt, then, the existence of some kind of mental influence over the function of the bowels. The exact nature of this influence may be an interesting subject for speculation and investigation, but here may not be considered. The useful application of the fact alone interests us here in the object of treatment. Psychotherapy is clearly indicated.

" Such a mess of puerile nonsense has lately been exploited with the public under the designation of psychotherapy that the very term now tends to arouse suspicion, distrust, and even disgust in the scientific medical profession. This is but natural for a conservative body, but cannot be justified. If psychotherapy has been debased and exploited by ' new-thoughters ' of every breed, it has also been cultivated and developed by scientific investigators and raised to a legitimate use. For its proper use no apology is needed.

" How then is psychotherapy to be applied? What are its limitations? What other factors can be combined with it to advantage, and how important are such other factors or accessory stimuli? It must be frankly admitted that these are questions not easy to answer in the space of a readable paper. Only the briefest outlines can be given in reply, and personal experience alone can satisfy. One might as well give rules to convert a heathen as to explain how to talk with a man who has constipation into a conviction and realization of its ready cure. The subtlety of psychology cannot be mastered by rules on paper. I can attempt, therefore, only to give the principles involved and a crude outline of the general average method of procedure. Variations to suit the individual must be suggested by the circumstances of each case. One person needs sympathetic persuasion, another logical exposition, another must be taken by storm and forced into submission.

" The *sine qua non* of success, I believe, is the evident sincerity of conviction of the physician arousing the hope and faith of his patient. The instinct of sincerity and confidence is felt by contact, and cannot be aroused by a lukewarm doubter.

Before trying this method of treatment, some degree of enthusiasm must be aroused in the physician himself by a knowledge of psychology and some general reading of the best works expounding its practice in therapy. If confidence in the method can be felt, enthusiasm and experience can be trusted to work out the details for successful practice. It was along such lines and by such procedure that I developed my own experience, still immature, but growing.

"I will not weary you with the details of conversation necessary to overcome the opposition of the patient and to secure not only his blind faith in the authority of his doctor, but also his logical persuasion. It would be impossible to reproduce the many arguments that were found expedient to convince the various types of patients. It should be emphasized, however, that the means of persuasion need not often include back-handed, indirect, and subtle suggestion, but only straightforward, simple, sincere, heart-to-heart conversation. Explanation of the way the mind operates in making and unmaking habit, unequivocal assertion that the psychological method meets few failures, is almost sure and certain, bolstering the wavering hope of the patient by reading the records of success in other patients, burning all bridges behind to prevent retreat by persuading the patient to actually destroy his drugs, these are the simple arguments that win the faith of the patient.

"When once his faith and confidence are enlisted, the rest is easy. A single fixed time for a daily movement of the bowels must be chosen and all efforts concentrated to produce regularity of action at this time, i.e., habit. In fixing the time for the movement, some consideration should be paid to the patient's convenience and duties. Furthermore, inquiry should be made as to whether there is any tendency whatever for natural defecation to occur at any special time. If so, advantage should be taken of this tendency, slight and irregular though it be, and this time should be the one chosen for the regular movement. In the great majority of patients the most natural

and convenient time is a few minutes after breakfast, and unless strong reasons for selecting another time are presented this should be chosen. The patient should go to stool at the exact appointed time, whether or not any inclination to defecate is felt in advance. While at stool he should concentrate his attention upon his object, should avoid premature straining, and should not coax his bowels too long in case spontaneous action does not soon occur, waiting at the most ten minutes. If success is not obtained within this time, postponement of further effort should be made to the next day at the same hour.

"If strong inclination should be felt later in the day it should be resisted, and the bowels should be told, like a spoiled child, as it were, that they must move at one time and at that time only. In many cases, at the beginning, as the habit of constipation begins to yield, a difficulty is encountered in the occurrence of an urgent demand for defecation at other times than the appointed morning hour. The patient must be instructed to resist such inclination, however urgent, until the control of regular morning action has been thoroughly mastered. Subsequently, however, it will be found practicable and desirable in some cases to encourage the habitual action of the bowels a second time in the day, best at night.

"In case of complete failure for three days in succession, the large intestine should be emptied by means of a large enema and the patient encouraged to persist in his efforts. It is well not to suggest in advance the possibility of failure by directing the use of an enema after three days of failure, but rather to instruct the patient to report his success to the physician on the second day, when, if necessary, the enema may be ordered. As a rule, it will not be required. If there has been a partial success, the patient should be encouraged to persist and to expect greater success on the following days. When, during the first few days of trial, the bowels fail to move for three days in succession, the enema which is ordered should be taken immediately after the expiration of the ten-

minute period of effort for natural action, thereby causing a movement approximately at the regular time, thus helping to fix this time in the habit which it is sought to establish.

" Certain natural stimuli as accessories may be used to advantage at the start in helping to establish regularity. The most important of these are regularity in the general daily habits, going to bed at a fixed hour, rising at a fixed hour, taking a morning cold sponge bath, sipping a glass of water while dressing, taking breakfast at a fixed hour, and eating an abundant coarse diet including a variety of vegetables, fruit, brown bread, and similar articles. Plenty of water should also be taken. Precise directions covering all such details should be given because of their importance as accessory stimuli and also for the psychological effect of painstaking directions upon the patient. After success has been obtained and regularity long established, the patient need pay little or no further attention to the accessory stimuli. He will lead a normal life and will not return to his former habits. If he should chance to lapse on a single day now and then, it will give him no concern, he will not think of taking a dose of physic, but will confidently await success on the next day at the appointed hour. His mentality regarding constipation is completely changed. He can even take a dose of physic on special occasions without the slightest fear of interrupting his established habit of regularity. In short, when once cured he remains cured because he has established a fixed habit of control of function.

" Many physicians claim, when the outline of this treatment is presented, that it represents nothing new, is similar to what they have practiced, and that they have always sought to establish regularity of function at a specified time. Whether it is new is unimportant, that it is effective with only rare exceptions establishes its claim to some degree of distinction from the methods commonly practiced. This distinction lies chiefly in its emphasis on psychological influence. The thoroughness and persistence with which such influence is exerted determine its success. A full hour or more is required for

the first interview with the patient, and thereafter frequent and regular reports by him should be insisted upon to enforce the principle and to meet possible difficulties. Half-hearted trial and routine, lacking individualization, fail. Enthusiasm, thoroughness, and persistence succeed.

" It is not claimed that psychotherapy exclusively in all cases is sufficient. Often it is. But faulty habits in the mode of living must be corrected. If a man eats too little, or food that is too fine, rich, and concentrated, he must be given a diet that is sufficiently abundant, bulky, and coarse. If he leads a sedentary life, without sufficient exercise to maintain a healthy constitution, he should be encouraged to correct this fault, and appropriate and congenial recreation and exercise should be discovered and prescribed. If the patient is nervous, thin, and tired, increased rest must be insisted on and forced feeding instituted. How frequently are such patients made worse in all their symptoms by excessive exercise, such as horseback riding, bicycling, hard walking and climbing, prescribed by physicians? I have seen the case of a constipated, dyspeptic, reduced neurasthenic stock breeder, whose occupation had kept him in the saddle daily for years, apply for relief to a great hospital, and be directed to get out of bed, go out on the street and walk, in order to get fresh air, exercise, and strength!

" Even drugs may be employed, if clearly indicated, to combat special conditions and complications. Constipation in a girl with chlorosis cannot be cured permanently until the chlorosis is cured by iron. The constipation dependent upon diseases of the heart requires perhaps a course of digitalis. Such clear indications for drugs need not be denied or avoided. Their proper use in no wise compromises the principle of rational psychotherapy. Constipation secondary to organic diseases is, however, not included in the subject of this paper, which, as is implied throughout, concerns only or primarily functional habit constipation. In this condition drugs should be used with caution and cathartics not at all, in my judgment.

In the series of cases here presented cathartics or laxative drugs were not once used. Few drugs of any kind were ever employed, and when they were their identity and purpose were frankly stated to the patient. In a few instances a few doses of sodium bicarbonate and bismuth or belladonna were administered to relieve gastric pain. Bromides were sometimes used at the beginning in cases of general nervousness with constipation. In several cases of malnutrition in constipated neurasthenics, nux vomica was pushed vigorously. Broadly speaking, nux vomica as a general tonic to the nervous system and to appetite and digestion was the only drug that played any appreciable part in the treatment of the cases as a whole. When it was prescribed care was taken to inform the patient that it was not a cathartic, but merely a general tonic, thereby maintaining consistency and authority with the patient in winning moral control.

" STATISTICS AND OBSERVATIONS.—*Final Results.*—Cases treated, 69; cured, 68; failure, 1. These 69 cases were all cases of habit constipation of long standing, varying from a few months to fifty years or more. The only complete failure was in the case of an educated woman, aged forty years, a most obstinate neurasthenic, who gave the impression of caring more for her complaints and the sympathy they aroused than for their cure. The cause for this failure may, however, be related to the possible effects of several attacks of peritonitis which had occurred about twenty years before from pus tubes.

" *Time Required for Cure.*—This varied from one day to four weeks; the majority of cases were cured within two weeks, several in a single day. The case requiring four weeks proved about two months subsequently to have inoperable cancer of the rectum; in spite of this the cure remained complete until an operation of colostomy was performed three months after the cure. Some of the cases of longest duration and greatest obstinacy were cured on the first day, as, for instance, a strong man, aged fifty-two years, leading an out-of-door life, who stated that he had never within his recollec-

tion from earliest childhood had a single movement of the bowels except as a result of cathartics. His complete and permanent cure was established the next morning after a single interview, more than a year ago. During this period his bowels moved regularly and sufficiently every morning except for an interruption of two days following an automobile accident. Similar one-day cures, while the exceptions have not been rare, and include a wide range of types of patients, strong men apparently without nerves and weak nervous women, two of the latter bed-ridden neurasthenics with many serious symptoms in addition to constipation.

"*Permanency of the Cure; Relapses.*—So far as I know, not a single case in the sixty-eight reported as cured has permanently relapsed into the previous condition, though such a possibility cannot be denied, as several of the cases disappeared. So far as I have been informed, in only a few instances has a partial relapse occurred and then only temporarily."

CHAPTER IV

SIMPLE CATARRHAL PROCTITIS; SIGMOIDITIS; MEMBRANOUS COLITIS

THE structure of the mucous membrane of the rectum and · sigmoid with their myriads of Lieberkühn follicles, together with the fact that these are the resting-place for fecal matter for so long a time, makes them peculiarly susceptible to this form of inflammation. Under this heading are included only the simple catarrhs, *i.e.*, such inflammations of the mucous membrane as are not due to any specific germ yet recognized. The specific catarrhs, on account of the fact that they almost invariably terminate in ulceration, will have separate consideration under Specific Ulceration.

The similarity of the glandular element of the rectum and sigmoid, and even of the colon, together with their functional resemblance, makes it very improbable that this form of inflammation should be confined to any one of them for any length of time, although there are cases where the inflammation may be confined to one of these localities. Simple catarrh may be either acute or chronic; the latter subdivided into atrophic, hypertrophic, and membranous catarrhal colitis.

Acute Catarrhal Proctitis.—ETIOLOGY.—This may be induced by sudden changes of temperature; irritating or stimulating food; very frequently by the lowering of the local temperature as by sitting on cold marble; injection of irritating substances into the rectum; and by impacted fæces and foreign bodies. There is almost unquestionably a predisposition on the part of certain individuals to catarrhal inflammations in general, and of the rectum and colon especially. I have said advisedly that simple inflammations may be induced by these causes, implying only that the vitality of the parts is thereby lowered, thus allowing non-specific organisms to get in their work.

Symptoms.—The attack may be ushered in by a slight chill, general aching pains especially about the sacrum and around the pelvis, with slight elevation of temperature, and a sense of weight, heat, and burning in the rectum. If the disease is high up there will be more discomfort in the lower abdomen, but tenesmus, bearing down, and a desire to go to stool will be very marked. This is also likely to be attended with the frequent desire to micturate. The stools are frequently soft, or even fluid, mixed with mucus and often with small flakes of blood. If the inclination is severe and persists for several days it may terminate in ulceration and even in sloughing of the mucous membrane. Should such a result follow, the discharge from the rectum will become muco-purulent or sanguinopurulent. In children the frequent continued straining is likely to bring on prolapse of the mucous membrane.

On palpation the parts feel hot, dry, and very sensitive in the first stages; subsequently, moist and slimy, from the excessive secretion of mucus. Through the speculum the mucous membrane is bright red in color and œdematous; subsequently, the color is a darker red. The inflammation is generally confined to the mucous membrane; it may extend to the submucosa, seldom to the muscular wall.

Dr. Dwight H. Murray, Syracuse, New York, has reported to me a case (which I quote) of pigmentation of rectal mucous membrane, which was evidently a condition due to acute proctitis: " Proctoscopic examination shows a dark brown almost blackish color of the mucous membrane from the anus upward, as far as can be seen. It is also studded with small yellowish spots, pencil-point in size, some larger, having the appearance of tissue undergoing fatty degeneration. The mucous membrane bleeds rather freely."

Treatment.—In mild cases the inflammation will generally subside under rest and repeated irrigations of the rectum with warm water containing some mild antiseptic; this is best done by a rectal irrigator (Fig. 33). The one here pre-

sented is, I believe, the best. It was devised by A. L. Wolbarst, and shown at the meeting of the American Urological Association, Atlantic City, New Jersey, June, 1909. Dr. Wolbarst believes it to obviate the objectionable features of the Kemp and Chetwood tubes, which are in general use.

The tip of the instrument is of soft, pliable rubber, which gives easily on contact with the rectal wall, and the flow of fluid into the rectum is through a number of small openings, thus providing a fountain spray instead of a single or double jet.

The apparatus consists of two tubes, a small one inside a larger. The water enters through the small tube (Fig. 34a) and fills up the soft rubber pouch (Fig. 34b) which is per-
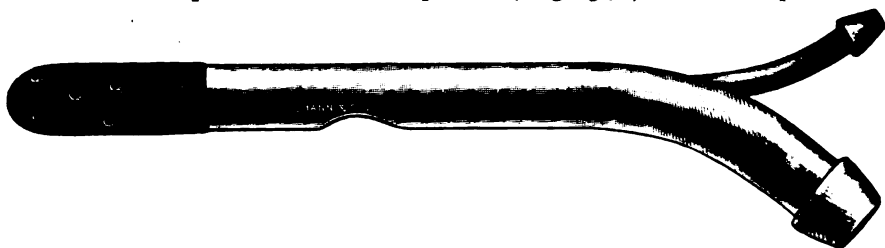
FIG. 33.—Wolbast's improved rectal irrigating tube.

forated with numerous pin-head openings, through which the fluid enters the rectum. Escape from the rectum is only possible through the large opening (Fig. 34e) in the larger tube. The external sphincter prevents any outflow at the anus.

The instrument is made of nickle-plated brass tubing, with a soft-rubber tip; its total length seven inches, including the rubber tip. The diameter is equivalent to 38 of the French scale. The soft rubber projects 1⅜ inches beyond the end of the large tube; it is slipped over the bulbous end of a short metal tube, the distal end of which is provided with a male thread, which is screwed into the end of the large tube (Fig. 34e) and thus securely wedged in place; also can unscrew the rubber tip and thoroughly clean it and the metal tubes at will.

In all cases, however, the entire large bowel should be thoroughly evacuated by a large dose of castor oil. Great relief may be obtained by the application of a hot-water bag to the perinæum. The diet should be devoid of much refuse or irritating material, and should consist of concentrated proteids, such as eggs, broths, and finely-minced meats, which are digested principally in the stomach and contain a minimum amount of refuse; also the simple starchy foods, such as rice and tapioca, with a moderate amount of sugar. Milk is to be prohibited, except in very moderate quantities with the starches, on account of the hard scybalous masses that are formed from it.
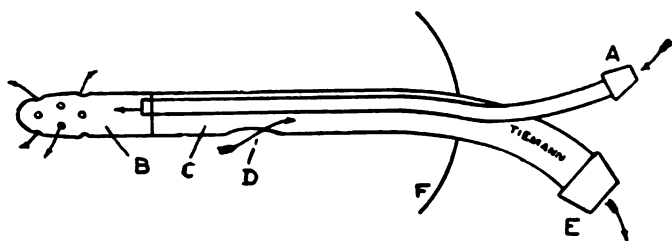
FIG. 34.—Wolbast's improved rectal irrigating tube.

Should the inflammation proceed to the ulcerative stage, in addition to irrigation with warm antiseptic solutions, local applications may be made through a proctoscope once in twenty-four hours, or 1 to 2 per cent. solution of nitrate of silver, or a 15 to 20 per cent. solution of argyrol. Either of these may be applied with a cotton swab or, better, in a spray. Should the rectum be too sensitive for the introduction of a proctoscope, these solutions may be injected into the rectum with a small hard-rubber syringe, in quantities from one to two ounces, with the hips well elevated.

The patient should be confined to bed until pus and blood have disappeared from the stools and until after the sense of weight and bearing down have passed away. The restricted diet should, however, be continued for at least several days longer.

Medicines by the mouth are seldom needed in these cases, except opium in some mild form to allay the straining and discomfort about the rectum; even this is better with starch water in the form of an injection. Subnitrate of bismuth in 20-grain doses with salol in 5-grain doses may be given with some advantage to lessen the irritating character of the discharges and to control excessive fermentation.

Chronic Proctitis.—There are two types of chronic catarrhal inflammation of the rectum, the *hypertrophic* and *atrophic;* if the acute form should become chronic it generally assumes the hypertrophic type.

HYPERTROPHIC CATARRH.—This must not be confounded with proliferating rectitis, which is a syphilitic inflammation.

Pathological Changes.—In this form of inflammation both the mucous membrane and submucosa are always thickened, the glandular elements much hypertrophied, the intertubular substance considerably increased, in conjunction with the connective tissue of the submucosa: it may extend up into the sigmoid. In simple hyertrophic catarrh the bacteria found in the scrapings from the surface of the bowel show only such organisms as are found in the normal intestinal tract. It may follow the acute type, or may result from the same causes, acting in a more gradual and milder way.

Symptoms.—If it succeeds an acute catarrh the acute symptoms may nearly subside with a gradual development of the chronic ones, otherwise they are vague and indefinite in the early stages. There is flatulency, tenesmus, loss of appetite, and general malaise; diarrhœa frequently alternates with constipation, although the latter is the usual condition and may be attended with a frequent desire to defecate, which results only in the passage of a small quantity of mucus; the stools containing a considerable quantity and, sometimes, mucopus.

The above symptoms, especially disorder of the digestive system, and constipation become more marked as the disease progresses. The patient loses strength, becomes more nervous and anxious about his condition, and there is frequent

exhaustion following the stools. Pruritus is a frequent symptom, most commonly due to oozing of mucus through the sphincter. For the same reason the radial folds become hypertrophied and frequently the papillæ around the anal margin become so hypertrophied as to form typical condylomata. The most satisfactory method for confirming the diagnosis is through the speculum, which shows the mucous membrane of the rectum to be œdematous, thickened, pale, and covered with a thin whitish secretion. When the mucus is wiped off the mucous membrane presents a somewhat granular appearance.

Treatment.—The treatment is likely to be prolonged and tedious, and the results from local treatment being uncertain; it is well to be cautious in giving a prognosis, as it may be necessary to operate in order to effect a cure, though, before resorting to such a procedure, it would be proper to exhaust all therapeutic measures likely to produce the desired result.

As in acute catarrh, the first thing is a thorough clearance of the large bowel, this being best effected by castor oil. After this, the bowel shoud be well flushed with a warm solution of antiseptic powder N. F. 1 to one pint, with the patient in a knee-chest position and the solution passed in very slowly.

Diet.—A restricted one, as prescribed in the acute form, containing fresh lean meats, eggs, sugar, and such starches as contain the minimum amount of residual matter is best, taking care in the use of the latter variety of foodstuffs to restrict them in quantity and character in order to limit the acid fermentation to which they are liable to give rise. White potatoes, for this reason, should be positively prohibited; rice and cornstarch being substituted, and certain tender green vegetables allowed, as spinach and asparagus-tips. Let milk be taken only in very small quantities; coffee and tea have no bad effect in the majority of cases, but alcohol in all forms should be proscribed.

Medicinal Treatment.—The bowels should be kept free from fecal matter, and this is usually accomplished by the antiseptic douches; but the water that comes away should be

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examined to see that it contains the requisite amount of fecal matter, and, when it does not, administer a gentle laxative, such as moderate doses of cascara.

The excessive intestinal fermentation to which these patients are so prone may in a measure be controlled by the use of aspirin in from five- to ten-grain doses, given three hours after meals and preferably in capsule form.   Local applications directly to the diseased bowel should be made daily or on alternate days, either following the antiseptic douch or an irrigation by plain sterile water.   These applications should be made through a proctoscope, better in the form of a spray or applied by the means of a cotton swab.   They should consist of a 20 to 30 per cent. solution of argyrol, or a 30 per cent. solution of ichthyol, or an application of an emulsion made with the following proportions:

Iodoform .... 1 dram;
Bismuth subnitrate .... 2 ounces;
Olive oil .... 1 pint

(Dr. J. M. Mathews) ; or a 1 to 2 per cent. solution of nitrate of silver.   If, after being used for a reasonable length of time (from two to three months), these measures fail to relieve, then resort may be had to surgical measures, appendicostomy, hereafter to be described, its rationality lying in the probability that most, if not all, of the large bowel is involved in the catarrhal condition, and the only efficient means of meeting it consists in being able to irrigate the large bowel from the cæcum down.

Atrophic Catarrh.—This form of catarrhal inflammation is said to be common, but such has not been my experience. It is not generally found until the age of puberty, but occurs in increasing frequency with the advance of age.   It is generally confined to the rectum and sigmoid.

PATHOLOGY.—Upon examination the mucous membrane is found to be dry, rough and inelastic, presenting a peculiar appearance upon inspection.   The surface seems laid off in

.irregular squares with lines separating one from the other, the surface within each square seems slightly raised above the intervening lines. Taken collectively, it much resembles small block tiling, an appearance peculiar, I believe, to this form of inflammation, and so far as I know to be taken as one of the surest diagnostic signs. In addition there is frequently found, attached to the surface here and there, small masses of dry fecal material, and occasionally small pieces of necrotic epithelium, the microscopic examination frequently confirming this by showing the epithelium absent in many places.

The glands of Lieberkühn are frequently atrophied, the intertubular tissue decreased, the goblet-cells diminished in number. Quenu and Hamonic affirm that in these cases the cylindrical epithelium is changed to the stratified pavement type. The tile-like appearance of the surface, previously described, would seem to indicate such a change in the epithelium, although the authors just quoted affirm such change not to extend more than one or two centimetres above the anal line and to be confined to the surface, not involving the tubules. The connective tissue of the submucous coat is dense and slightly thickened.

ETIOLOGY.—Dr. James P. Tuttle has observed atrophic catarrh to be so frequently associated with obscure syphilitic disease that there must be some dependence of the former upon the latter. With this exception, there does not appear to be any one very definite etiological .factor to account for this trouble, though I do find it, however, following high living, close confinement with hard work in badly-ventilated rooms, and eating improper and insufficient food. It may also result from the practise of sodomy, the use of irritating enemata, and from foreign bodies in the rectum, and it may follow chronic inflammation of the pelvic and genito-urinary organs, by vascular or lymphatic extension.

Symptoms.—There is nearly always a history of a long continued constipation, with dry and hard stools, which are more or less coated with mucus; these stools are frequently

followed with severe pain and heat and burning in the rectum, with some degree of spasm of the sphincters. The stretching of the anal folds produces cracks or minute fissures in the mucocutaneous tissues, with, nearly always, marked dilatation of the rectal ampulla. The mucous membrane of the entire rectum may be eroded and deeply ulcerated in spots, probably due to the traumatism produced by the passage of the dry and hardened fæces over an improperly lubricated mucous membrane and its subsequent infection. There is likely to be indigestion and flatulency, with other concomitant symptoms of the former and, very probably, as in hypertrophic catarrh, some pruritus ani.

Treatment.—This form of catarrh being practically limited to the rectum and lower sigmoid, can be best treated locally. Keep the surfaces free from irritating fecal matter by irrigations, these serving as an antiseptic, and stimulating applications to the mucous surfaces. These irrigations may be made to serve the purpose of hastening the absorption of inflammatory products by stimulating the circulation with hot water which is allowed to flow through a rectal irrigator, for fifteen to twenty minutes at a sitting. As an antiseptic the pulv. antisepticus N. F. 1 dram to 1 pt. and other mild antiseptics may be used. Should these irrigations fail to thoroughly empty the rectum and sigmoid of fecal matter, then recourse may be had to gentle laxatives, such as fluid extract of cascara, in 15 to 20 drop doses.

While the diet needs to be regulated, so as to exclude irritating substances, it need not be so rigidly exclusive as in hypertrophic catarrh.

Local Applications.—These should be made daily through the proctoscope, carried up to the sigmoid, after the bowel has been thoroughly washed out with the antiseptic solution. These local applications may be more stimulating than in hypertrophic catarrh, as for instance with a 5 per cent. solution of nitrate of silver, a 30 per cent. solution of argyrol, etc., all better applied by spray.

If the atrophic catarrh is complicated by the existence of hemorrhoids, which is frequently the case, these should be removed by the usual methods, but it is better to wait until the inflammatory condition has in a large measure subsided.

Fistula and extensive ulcerations, which are also frequent complications in atrophic catarrh, may be treated in the usual manner, except that it would not be prudent under these conditions to close up the fistulous tracts immediately.

Sigmoiditis.—The sigmoid is peculiarly susceptible to both the milder and more aggravated forms of catarrhal inflammation, the latter even involving all the coats of the bowel (as will be shown hereafter), on account of its being the special abiding place for the retained fecal matter. Considerable light has recently been thrown on this condition in its more aggravated form, sigmoiditis.

Sigmoiditis may be divided into the simple and the infectious. I only deal here with the former, the latter being considered in connection with the specific ulcerations of the rectum, as dysenteric, tubercular, etc. Simple sigmoiditis may in turn be divided into catarrhal, ulcerative, and interstitial. The simple catarrhal form may be either acute or chronic, and is nearly always due to a previous constipation, with a sigmoid overloaded with hard, dry, fecal masses, which produce erosions of its epithelial surface and stasis in its circulation. It may, however, be an extension from an attack of proctitis, or a part of a general enteritis.

Symptoms.—Constipation very pronounced, flatulence, loss of appetite, griping pain, frequent desire to defecate, with passages of hard lumpy fecal matter, or sometimes by watery stools, as in impaction of the rectum; these are attended with mucus, and sometimes with blood. These symptoms may all subside in a short time, following a thorough evacuation of the bowels, to recur with another attack of constipation. It is these recurrences that give rise to the ulcerative, and the latter to the interstitial form of the disease, both of which are attended by the same symptoms, in an aggravated form,

except that in the ulcerative there is a decided increase in the amount of blood and mucus passed, also an increase of pain; and in the interstitial form there is decided tenderness in the left iliac region, simulating closely a left-sided appendicitis, with dulness on percussion and induration; both of these latter varieties are likely to be attended with elevation of temperature.

The interstitial variety, which is merely an extension of the inflammatory condition to all the coats of the sigmoid, including its peritoneal coat, is that form which gives rise to the classical diverticulitis and perisigmoiditis which has recently attracted so much attention among various writers.

While perisigmoiditis may be occasioned by an extension of inflammation from adjoining organs, the large majority of cases reported have been primarily due to a weakening of the sigmoid wall by inflammation, then to the formation of diverticula. The latter, which may also be congenital (although Telling, writing on its etiology, says it is significant that no case in a child has so far been recorded), becomes filled with fecal matter, gradually resulting in a leak into the mesosigmoid or into subperitoneal tissues, giving rise to inflammation and frequently to suppuration. It is in this latter condition that the walls of the bowel and its meson become so thickened and indurated as to be mistaken for malignant growths. George Emerson Brewer, Mayo, and Byron Robinson were the first to call attention to the true character of this condition, and its differentiation from malignant growths in this locality. Thos. S. Cullen reports a similar condition, Diverticula of the Rectum (*American Med. Assn. Journal,* Nov. 1, 1904). (Fig. 35.)

Digital examination of the rectum reveals little except the presence of the thickened tissues above, and this only by counterpressure over the left inguinal region. By the proctoscope little can be seen, except in the acute and ulcerative stages, when the inflamed or ulcerated mucous surfaces will

present the same appearances as those described under the head of Simple and Ulcerative Proctitis.

The ulceration of the mucous surfaces may be present in the interstitial stage, but of course nothing further than the ulceration could be appreciated through the proctoscope. This condition can be best estimated and diagnosed by touch and palpation through the abdominal walls. Both Byron Robinson

FIG. 35.—Tumor of the sigmoid flexure due to rupture of diverticula into the surrounding adipose tissue. Small pelvic abscess.

and J. Rawson Pennington have called attention to the influence of an overloaded sigmoid from constipation as a factor in pelvic diseases.

Treatment.—Simple ulcerative and interstitial sigmoiditis, when not complicated with diverticula require the same treatment as that for similar stages of proctitis—namely, keeping the bowel free from accumulations of fecal matter, and using

antiseptic irrigations in the knee-chest position. When the interstitial stage is complicated by diverticula, perisigmoiditis, or mesosigmoiditis, or if the latter conditions should be the result of a leakage of fecal matter from a congenital diverticulum, surgical interference must be resorted to. The clinical evidences of diverticulitis are in the form of inflammatory trouble, more or less acute, in the left lower abdomen, left-sided tumor, and abscess formation, intestinal obstruction, perforative peritonitis, or vesicocolic fistula.

As Telling has pointed out, " inflammatory trouble of the above kind in a patient of middle age, or older, one who had been the subject of marked or former constipation, might at best render a diagnosis of *diverticulitis* very uncertain and it would be much safer to label such a case *sigmoiditis,* one of the commonest causes of constipation."

DIFFERENTIAL DIAGNOSIS.—He also says (*London Lancet,* March 28, 1908) : " The chief conditions to be considered in differential diagnosis would appear to be (*a*) ordinary appendicitis with left-sided symptoms; (*b*) pelvic inflammations; (*c*) ovarian cysts with strangulation, or inflammation; (*d*) actinomycosis of the sigmoid flexure; and (*e*) syphilitic and tuberculous pericolitis. This list does not exhaust the possible sources of error; diagnoses of pancreatic, ovarian, and cæcal tumors have been made."

George Emerson Brewer (*Journal of The American Medical Association,* August 15, 1908) says that from his experience " acute diverticulitis, like appendicitis, may be divided into four clinical groups: Group 1, in which there is a mild inflammation of a diverticulum, which subsides like a catarrhal appendicitis under rest and appropriate medication. Group 2, with inflammation more severe and progressive, in which the diagnosis is made and an operation performed before rupture takes place. As the opening connecting a given diverticulum with the intestine may be small, the acute inflammatory process may serve to completely occlude it, and empyema of the diverticulum, with or without the presence of

a concretion, may develop. Group 3 would comprise those cases in which there has been a rupture of the diverticulum, with the formation of a localized intraperitoneal abscess, or if the diverticulum is situated in a portion of the intestine not covered by the peritoneum, the entire process may be without the peritoneal cavity. The history of the first attack of the patient reported would correspond with this type of the disease. Group 4 would include all cases in which rupture of the inflamed diverticulum into the free peritoneal cavity had taken place, with a resulting spreading and generalized peritonitis.

"The symptoms and signs of acute diverticulitis are practically identical with those of acute appendicitis in its various forms, the only difference being that the former occurs as a rule on the left side of the abdomen, rather than on the right.

"Sufficient data are not available to enable determination as to the percentage of inflamed diverticula that actually perforate, it is therefore not possible to state dogmatically whether a given case of acute diverticulitis, with comparatively mild symptoms, should be subjected to immediate operation, or be treated more conservatively. In my opinion, however, the clinical course of the disease is so similar to the various forms of acute appendicitis, that the treatment should be the same. Certainly in all acute cases, with severe and progressive symptoms, safety lies in early operation.

"Regarding the operative technic of the treatment of inflamed, or gangrenous, diverticula, my experience has been far too limited to lay down any hard and fast rules, but I am of opinion, however, that if the diverticulum is small, or attached to the bowel by a narrow pedicle, removal with closure of the intestinal wound by a purse-string, or several Lembert sutures, should be done, provided the surrounding intestinal wall was not too much infiltrated. In the event of the diverticulum being large, attached by a broad base, or covered by a plexus of enlarged vessels, the safest method would be the one employed in the case reported, that is, by

extraperitoneal drainage. If the situation of the lesion is such that extraperitoneal treatment cannot be carried out, I suggest packing with gauze from the abdominal wound to the lesion, leaving this packing in place from forty-eight to seventy-two hours, or until firm adhesions have formed about the gauze; then removal of the gauze and free opening of the abscess, and allowing it to drain through the channel thus formed.

" If rupture has already occurred, the intestinal wound should be united by suture, if this be possible; if not, adequate drainage should be provided."

Membranous Colitis.—Although the colon above the sigmoid is not regarded as belonging to the field of the rectal surgeon, yet abnormal conditions of discharges from the rectum are now so generally regarded as due to some local functional, or pathological, lesions that they are generally referred to the rectal specialist for diagnosis and treatment. This is particularly true of membranous colitis, a form of the disease to be considered under this heading.

Colitis may be divided into simple and specific, the former only to be here considered under three aspects, acute, chronic, and membranous; the latter may be a stage of either of the former. It is generally believed that there are many cases of an aggravated form in which neither inflammation of the colon, nor any other of the local pathological conditions, hereafter to be described as exciting causes, can be found. These are considered to be purely neurotic in origin, but it may be safely said, that if a careful search is made in all cases, one of the pathological lesions will be found as an exciting cause.

ETIOLOGY.—While the causes that produce acute and chronic forms are similar to those of hypertrophic and trophic proctitis, the consideration and treatment of which answers for that of colitis, there are additional causes active in the production of the membranous variety.

Kaabak and Rosenschein give as the result of their research, the fact that mucus is produced in excessive amounts only at the point where there is local irritation. They found it impossible to induce production of excessive amounts of mucus by applying irritation at other points. Their findings are confirmatory of others in this line and emphasize the necessity for assuming circumscribed local irritation as the cause of increased production of mucus in any stretch of the intestines, or in the stomach.

A. B. Cooke (*Transactions American Proctologic Society,* 1909, page 91), in an article on " Diseases of the Colon Due to Extra-intestinal Causes with Special Reference to Membranous Colitis," says: " Personally I have never seen a case of chronic colitis of any type in which I failed to find unmistakable evidences of a pathological lesion in the mucosa, though I have seen cases in which it was impossible to demonstrate the presence of pathological conditions of other viscera.

" With reference to this type of colitis I am prepared to state unequivocally that I have never seen a case in which I failed to find some gross pathological condition of one or more abdominal organs as well as the mucosa itself; and furthermore that the etiological relation between the two has been clearly established in a number of cases by the prompt and permanent disappearance of the bowel trouble upon the correction of the extra-intestinal conditions after all other methods of treatment had failed."

The most generally recognized causes giving rise to membranous colitis are the following:

(*a*) Inflammatory adhesions to the pelvic organs or walls. " Pathological fixation of any portion of the colon, even though only partial, is necessarily attended by retardation of peristalsis, with the result that the bowel is exposed to increased traumatism from within as well as from without. In this way inflammation of the mucosa is induced and mucous and membranous colitis, which are merely advanced stages of

the inflammatory process, follow. The sites at which these adhesions are most frequently encountered are the cæcal region, the gall-bladder region, and the sigmoid loop of the colon by extension of the inflammatory process from the pelvic organs."—A. B. Cooke.

(*b*) Regarding subacute inflammation of the vermiform appendix, when not a part of a general colitis, Howard A. Kelly in his work on " Appendicitis and Diseases of the Vermiform Appendix " says: The association of membranous colitis and chronic appendicitis is frequently observed. Finney has especially noted its occurrence in cases where there is a thickened, chronically inflamed appendix, densely adherent to the neighboring intestines. Some writers have attributed the disease of the appendix to the influence of the chronic colitis, but the evidence as a whole favors an appendiceal origin, the affection of the colon being secondary. In many instances acute attacks of appendicitis have antedated the appearance of symptoms of colitis, and it is a common experience to find that the latter is entirely relieved by the removal of the appendix. Lapeyre (*Zcit. f. Chir.*, 1903, page 498) described six cases in which coincident appendicitis and mucomembranous colitis were cured by removal of the appendix.

The relation of mucous colitis and appendicitis is very interesting. As I have said elsewhere, obstipation and colitis with mucous stools are often the signs of a latent appendicitis, and are cured by the removal of the appendix. The differential diagnosis, as a rule, rests upon the history of mental strain or worry preceding the onset of the trouble and the presence of marked nervous manifestations, such as hysteria, hypochondriasis, etc. On the other hand, a history of a preceding acute or chronic appendicitis is exceedingly suggestive of the appendiceal source of the trouble. In any case of mucous colitis in which nervous symptoms are not a predominant feature of the disease, appendicitis should be suspected.

Tuttle in a paper on " Mucous, Mucomembranous, and Membranous Colitis " (*New York Medical Journal*, Vol. 85,

1907, page 823) has recorded twenty-two such cases associated with chronic appendicitis, nineteen of which were entirely relieved by an operation for appendicitis; the three failures prove rather than refute the dependence of membranous colitis upon peritoneal adhesions, as in each of the three there were extensive adhesions involving more or less the entire caput coli, and although broken up they reformed as shown by subsequent laparotomies.

(c) It may be associated with malignant diseases of the bowel, for in sixty cases of membranous colitis reported by Dr. W. Hale White, three of them were so associated in the large intestine.

(d) It may be due to a floating kidney. In five of the cases reported by White and four by Tuttle there were floating kidneys on the right side, all the cases being relieved by restoring and anchoring the kidney in its normal position. A. B. Cooke says: Normally, the upper extremity of the posterior surface of the ascending colon is in direct contact with the anterior surface of the right kidney. When, from any cause, the kidney becomes loosened from its bed the only direction in which it can move is downward and the same intimate relation is capable of being maintained throughout the whole length of this portion of the colon. It is further to be noticed that in the great majority of instances (70 to 80 per cent.) the posterior surface of the ascending colon, like the kidney, is retroperitoneal, being connected directly to the abdominal wall by areolar tissue, and that the pathway of a pathologically mobile kidney lies in immediate relation with this unprotected surface. With these anatomic facts in mind and remembering that the amount of the kidney's motion is, to a considerable extent, determined by respiratory action, it is not so remarkable that the mechanical irritation incident to its oft-repeated round-trip excursion over the same route should ultimately result in an inflammation of the colon.

(e) It may be due to enteroptosis. Cooke says of the association between these two that membranous colitis, in

the absence of other organic abdominal lesions to account for it, is so invariably found associated with enteroptosis that a definite causative relationship cannot reasonably be denied. It is true that marked neurotic disturbances are practically always present in cases of membranous colitis; but, with the facts set forth in mind, I believe the conclusion is a sound one that they may properly be regarded as an effect rather than causative of the latter.

The final and strongest argument in support of enteroptosis being a frequent cause of membranous colitis is to be found by contrasting the results of treatment. Those who undertake the management of these cases by directing their attention primarily to the accompanying neurotic phenomena, have little else than failure to report and with one accord emphasize the intractable nature of the malady; while those who accept the mechanical origin and local character of the trouble, and direct their treatment accordingly, are able in a large proportion of cases to afford relief.

(f) It may be due to disorders or displacements of the female generative organs. Now, from 70 to 80 per cent. of the cases reported by W. Hale White occur in women, so it will not be surprising to find disorders and displacements of the generative organs a frequent cause in the production of the disease.

Symptoms.—Those most prominent and constant are constipation, the passage of large quantities of ropy and membranous mucus, pains in the abdomen and limbs, and a varied assortment of neurotic manifestations.

C o n s t i p a t i o n .—These cases are nearly always preceded by habitual constipation, which becomes aggravated after the membranous colitis begins. Even in those occasional cases where diarrhœa is present, it is due to hard scybalous masses which are lodged in the saccules of the colon, and produce irritation which results in diarrhœa.

D i s c h a r g e o f M u c u s .—The characteristic symptom of membranous colitis is the discharge of mucus in the

form of tough tenacious membrane, which may even assume the mould of the bowel, or be discharged in large strips; these strips have often been mistaken for the membranous lining of the bowel, but they have been definitely determined as merely an altered condition of the mucus, which is so tenacious as to enable it to retain the mould of the bowel. There is a considerable amount of mucus in its ordinary form discharged at the same time with this membranous mucus.

The preceding symptoms are likely to be attended with severe griping in the abdomen; with wandering muscular pains in different portions of the body, and a feeling of exhaustion, especially in the lower limbs; both the abdominal pains and exhaustion immediately precede and follow the discharge of mucus from the bowel. These symptoms may continue for several days, to subside for several weeks, when they recur. Nearly as characteristic as the discharge of the membranous mucus are the neurotic symptoms, such as great mental depression, forebodings, and fears, which are nearly always present. So constant and pronounced are these symptoms, that they have been considered by such good authorities as Nothnagel, Ewald, and others to stand in some relation to cause and effect.

Treatment.—The treatment of acute and chronic colitis is similar to that of the same condition in the sigmoid. For membranous colitis, however, the treatment varies with the exciting cause. In all cases the necessity for laxative medicines is generally conceded; the best of which seems to be castor oil in one-half- to one-ounce doses every morning for a considerable length of time. If the stomach will not bear the oil, then sulphate of magnesia, or calomel, will be found to serve a good purpose. This form of treatment will only be likely to succeed in neurotic cases, or in the acute and chronic forms of colitis. In those due to inflammatory adhesions, appendicitis (when not a part of a general colitis), to floating kidney, to malignant growths of the large intestine, or to disorders and displacements in the female generative

organs, surgical interference will be found necessary. If after opening the abdomen not any of the above cited causes are found to exist, and the case has failed to respond favorably to a prolonged use of laxative medicine, then it may be found beneficial to use the appendix for irrigating the large bowel through its entire length.

ULCERATIONS, SIMPLE AND SPECIFIC

INCLUDED in simple forms of ulceration are those due to or infected by non-specific organisms, whether originating in traumatism or however produced. In specific ulcerations are embraced those due to or infected by specific organisms, as syphilitic, tubercular, dysenteric, and actinomycosis. These two divisions may be further subdivided according to location, viz.:

> Ulceration of Perianal Region.
> Ulceration of Anal Canal.
> Ulceration of Rectum, Sigmoid, and Colon.

Simple Perianal Ulcerations.—These are such as occur on the surface of the body in other localities and those due to causes to which this special part of the body is exposed by infection from fecal and vaginal discharges, following lacerations from hard fecal masses, or from foreign substances, with rough surfaces, in such matter. The accumulation of fecal matter in those of uncleanly habits will also account for a certain number of cases of ulceration.

The simple ulcerations occurring in this locality may be due to *traumatism, also to herpetic and eczematous eruptions.*

TRAUMATIC.—Any abrasion of the anal margin by hard fecal masses or abrasions by friction from clothing and various other causes of the perineal or buttock surfaces are very likely to be followed by infection and consequent ulceration, on account of the frequent contact of infected fecal matter as it passes out of the bowel.

Treatment.—The treatment consists principally in the removal of the cause, that is, the infected fecal matter, by absolute cleanliness, and the application of some bland antiseptic ointment.

HERPETIC.—These occur here, as on other surfaces of the body, generally close to the anal margin, resulting from infection of herpetic vesicles, by the presence of which this form of ulceration is recognized.

Treatment.—This is similar to that for traumatic ulcers, with the addition of tonics and the application of dusting powders, such as oxide of zinc and calomel in equal parts.

ECZEMATOUS.—Ulceration from this cause is due to infection of abrasions which are generally made by the fingers in the effort to allay the itching which attends the eczema.

Treatment.—Cleanliness and antiseptic powders, especially powders containing salicylic and boracic acid.

Ulceration of the Anal Canal.—While abrasions in this locality are exposed to infection from similar causes as those around the anal margin, the anatomical conditions are very different and the liability to infection much greater. Dr. F. C. Wallis has called attention to the fact that " these ulcerations occur in the lining membrane of the proctodæum, which is neither skin nor mucous membrane, which has not the resisting power of the one nor the vascular supply which is the great resisting power in the other." These ulcerations resemble fissures very much in appearance and symptoms. They are covered with granulation tissue, exude a thin acrid pus, and occur most frequently in the posterior quadrant.

Symptoms.—Burning pain, much increased during and after defecation. This is much greater the nearer it approaches the skin margin. Dr. Wallis thinks that pruritus ani is frequently caused by these ulcerations, as abscesses also may be, which occur in the adjoining tissues and the same holds good of their resultant fistulæ.

Treatment.—Stretching of the sphincter, slitting up the fistulous tracts, taking great care that no sinuses be overlooked; application of the electro- or thermocautery, or strong nitric acid. Subsequently the sores should be irrigated with antiseptic solutions or pure peroxide of hydrogen should be applied twice daily.

Ulceration of the Rectum and Sigmoid.—These are more frequent in the rectum than in the sigmoid and are of three varieties, *simple, hemorrhoidal,* and *follicular.*

SIMPLE ULCERATIONS of the rectum are such as result from the abrasion of its epithelial surface by foreign substances, especially by hard and dry fecal matter, with subsequent infection by the ordinary pus organisms, which are brought in contact with the abrasions through the fecal matter.

There may be certain *predisposing causes* tending to aggravate the character of the ulceration by lowering the vitality of the surrounding tissues, such as catarrhal inflammation (already considered), or a varicose condition of the vessels, or age. Some of these causes have been considered sufficiently important to designate the ulcers arising from them by their respective names, as varicose and catarrhal. I prefer, however, to include them all under one heading, and to regard these predisposing causes as aggravating conditions.

There are certain anatomical predisposing causes existing in all cases which make the rectum peculiarly susceptible to ulceration, such as the absence of valves in the rectal veins and the sluggish collateral circulation. Certain organic diseases may also act as predisposing causes, as herpetic disorders, valvular disease of the right side of the heart, and atheroma of the arteries.

Certain constitutional diseases may also be included as agents, such as Bright's disease, diabetes, and trophic ulcerations.

Exciting Causes.—The most usual are traumatism and the toxic action of certain drugs.

Symptoms.—While these are very similar for all varieties of ulceration they differ very materially in severity, depending not so much upon the size of the ulcer as upon its location; those located nearest the sphincter produce the most distressing symptoms. Diarrhœa is one of the earliest and most important symptoms; the stools soon become composed of mucus, pus and blood, and are attended with tenesmus and

bearing down. Incontinence of fæces may exist. If the ulcer is attended with a varicose condition of the superior hemorrhoidal veins it is likely to result in severe and even fatal hemorrhage, and to be covered with a thick yellowish pus.

Treatment.—The sphincter should be either thoroughly stretched or incised in order to facilitate thorough drainage and irrigations made with antiseptic solutions, three or four times daily. Stimulating applications, once daily, should be made directly to the ulcer, with a 2 or 5 per cent. solution of nitrate of silver, or a 20 per cent. solution of argyrol. The irrigations will keep the rectum free from fecal matter. To allay the irritability of the rectum it may be necessary to use an ointment composed of opium, hyoscyamus and belladonna in a collapsible tube with a nozzle, which is more convenient than suppositories. The patient should be confined to the recumbent posture while the tenesmus and bearing down continue. If the ulcer is attended with a varicose condition of the veins, it is better to elevate the hips for a considerable time before pus has time to form and gravitate up the bowel.

HEMORRHOIDAL ULCERS.—These are due to thrombosis of the hemorrhoidal vessels, complete obstruction of the circulation, with consequent necrosis, and the formation of an ulcer or a distinct hemorrhoidal tumor. They may also follow the abrasion and infection of an acutely inflamed hemorrhoid, or from the injection into the hemorrhoid of some corrosive substance, with the object of destroying it. The history of acutely inflamed hemorrhoids with the location of the ulcer on one of them is the most striking characteristic of this form of ulcer. Severe pain and frequently a rise of temperature in the early stage is present until the abscess cavity breaks, the pus is discharged, and the ulcer forms. The pain, however, soon returns and is attended with tenesmus and spasm of the sphincter.

Treatment.—This consists of complete removal of the hemorrhoidal mass together with the ulcer. If care is taken to thoroughly cleanse the ulcer, with the adjoining tissue, and

make it thoroughly aseptic, the wound may be closed by sutures, or, better, the mass may be removed by the clamp and cautery and the wound left to granulate.

FOLLICULAR ULCERATION OF RECTUM AND SIGMOID.—These ulcerations result from the breaking down of follicles in follicular proctitis, or sigmoiditis. Varying in size from a millet-seed to a hazel-nut; they may be single or multiple. As the ulcer involves the submucous layer and its orifice is constricted (which interferes with its draining properly) these ulcers are liable to perforate the intestinal wall. For the same reason they may become distended with fecal material and form diverticula.

Symptoms.—Beyond the occasional discharge of small quantities of pus, sometimes tinged with blood, with some griping and tenesmus, there are no other symptoms to direct us to the condition and examination through the proctoscope is the only reliable and positive means of making a diagnosis.

Etiology.—Not definitely known.

Treatment.—Local stimulating applications should be made daily directly to the ulcers, through the proctoscope; and irrigations with antiseptic solutions used twice daily in the knee-chest position if the ulcers are high up. If the ulcerations be multiple, obstinate, and extend up into the colon, it may be advisable to do an appendicostomy and irrigate the large intestine throughout.

ULCERATION ATTENDING STRICTURE.—This form of ulceration differs from the traumatic only in the character of the pathological lesions. The fibrous infiltration of the walls of the bowel, with the consequent interference with its circulation; the narrowing of its lumen, and the friction of the retained hardened fecal masses, combine to produce this ulceration just above the stricture, where the effect of the pressure and friction from the fecal mass is longest continued. In syphilitic strictures we have two additional causes, namely, the action of the syphilitic virus on the vessel walls producing

arteriosclerosis, and the constitutional effects of the disease, which lowers the vitality of the patient, making the liability to ulceration more likely.

Symptoms.—Bearing down, frequent and often ineffectual desire to defecate, with the discharge of a mucopurulent matter sometimes tinged with blood.

A further consideration of this form of ulceration, with its pathology and treatment, will be found under " Strictures of the Rectum."

The form of ulceration that attends the breaking down of carcinomatous growths should always be borne in mind and can be recognized by the characteristic symptoms of this disease, which will be found under it own subject heading.

Ulcerations that frequently occur in connection with such diseases as Bright's disease, diabetes, and chronic cirrhosis of the liver, are similar in their etiological factors to simple traumatic ulcerations. These attendant diseases merely act as predisposing causes, lowering the resistance of the tissues, and should be treated locally as simple ulcerations, the predisposing disease at the same time receiving its proper care and attention.

SPECIFIC ULCERATIONS

Specific ulcerations of the anus, rectum, and sigmoid are those due to a specific organism. Those ulcerations traceable to such a cause are: Tubercular, Dysenteric, Venereal, Diphtheritic, Carcinomatous, Bilharzia Hæmatobium, and Actinomycosis.

Tubercular Ulceration of the Anus, Rectum, and Sigmoid.—The discovery of the tubercle bacillus led to its recognition as the cause of many forms of ulceration in the anal and perianal regions, the pathology of which was formerly unknown. These ulcerations may be either primary or secondary. They may be propagated either by the blood-vessels to the adjoining tissues, or through the lymphatics, and advance in an inverse ratio to the amount of fibrous tissue in their path.

Pure cicatricial tissue forms an impassable barrier to their progress, a very important fact to be borne in mind by the surgeon when dealing with these ulcerations, lest he should cut through these barriers established by nature.

Tubercular Ulceration of the Perianal Region.—Where traumatism has occurred and the wound is exposed to tubercular infection the tubercular process may proceed under one of four types, namely, miliary, ulcerative, lupoid, and papillary, or verrucous ulceration.

MILIARY TYPE.—This very rare type is seen almost entirely in connection with general tuberculosis. It develops in minute nodules, or tubercles, that feel like millet-seed under the surface. They are always multiple. Several of these tubercles coalesce, caseation, then ulceration, follows; the overlying tissues become involved and break down and the ulcer forms. These ulcers are at first shallow cup-shaped, with ragged edges. Several are likely to coalesce and form extensive ulcers, whose character is determined by finding the tubercle bacilli in the scrapings from them.

Treatment.—The local treatment consists in keeping the ulcers perfectly clean and by gentle stimulation of the surfaces, with a 25 per cent. solution argyrol, pure ichthyol, or by dusting it with boracic acid and iodoform. Special attention should be paid to the patient's general condition, keeping him well nourished and with plenty of fresh air.

THE ULCERATIVE TYPE.—All tuberculous processes of the superficial integuments take on the ulcerative stage sooner or later. The usual tubercular process of infection, caseation, and suppuration, is followed in this type of ulceration. These ulcers are generally secondary, although they may be primary.

Diagnosis.—The finding of the bacillus in the scrapings.

Treatment.—Extreme cleanliness, antiseptic washes, or antiseptic dusting-powders, with the general constitutional treatment referred to above. The patient should not be confined to bed.

Malignant Ulceration of the Perianal Region.—See chapter on Carcinoma.

The RODENT ULCER, so graphically described by Dr. Allingham, and referred to by other authors as a distinct variety of ulceration, has now been definitely classified as a malignant form of ulceration.

Tubercular Ulceration of Anal Canal.—In this locality it resembles very much a simple irritable ulcer or fissure, except that its borders are irregular and undermined and more indurated at its base, the latter a provision by nature to stay the progress of the disease.

Lupoid Ulceration of Anal Canal.—This is only another form of tuberculosis, with considerably more infiltration beneath and around it; while this infiltration retards its progress, yet eventually it is very destructive to the tissues and obstinate in resistance to treatment.

VERRUCOUS ULCERATION.—This is still another type of tubercular ulceration, its chief characteristic being its papillary or mammillated appearance. Now that the finding of the tubercle bacilli in each of these forms of ulceration is the chief essential, little attention need be paid to these names; it is only necessary to establish the fact that they are tubercular.

Treatment.—Here, as in tuberculous ulcerations elsewhere, all unnecessary surgical interference should be avoided. Extreme cleanliness, with mild antiseptic irrigations, gentle stimulation of the wound, and thorough drainage, is the best that can be done for the local trouble. In the lupoid form of ulceration gentle curettage, followed by X-ray with general constitutional treatment gives the best results. The treatment of the verrucous form should be similar to that of simple tubercular ulceration.

Tubercular Ulceration of the Rectum and Sigmoid.—While infection of the intestinal walls may take place by the bacilli invading the solitary follicles, yet it is probable that it more frequently occurs through an abrasion of the

mucous surface.   The ulcers may be round or elliptical in the
beginning, but soon spread and become large irregular patches,
following chiefly the course of the blood-vessels, hence in the
lower portion of the rectum spreading in all directions, in
the upper portion horizontally, in the sigmoid having a ten-
dency to encircle the bowel (Fig. 36).   The healing of such
a horizontal ulcer explains the formation of stricture from
tubercular ulceration.

Stricture from tubercular ulceration may not only follow
the horizontal form of ulcer but those in the rectum that may
spread in any direction; one reported case of which I give:

FIG. 36.—Tubercular ulceration encircling the sigmoid.

R. F. W., age thirty-two, presented himself August 1, 1908,
with stricture of the rectum.   About ten years ago he was
injected for hemorrhoids, probably with a sol. acid carbolic
by a quack.   The injection was followed by excessive pain
and a large swollen tumor, which subsided after several weeks.
About one year afterwards he was operated on by a general
surgeon, who did what appeared from the scar to be a proc-
totomy.   The stricture had gradually closed until the opening
was only about one-half inch in diameter; stools frequent and
attended with a great deal of tenesmus.   I did a resection, in

which I was able to save both sphincters, making my lower circular incision just above the internal sphincter. The operation was very successful, the wound healed promptly, and the patient has almost complete control over the sphincters. Pathological findings showed great fibrous thickening of the walls of the bowel, with numerous tubercles.

Symptoms.—The symptoms of tubercular ulceration of the rectum and sigmoid will be influenced largely by the location and extent of the ulceration; if low down in the rectum there will be decided tenesmus, straining and frequent stools; if high up, frequent stools with a discharge of mucus, pus, and blood; as the ulceration extends, the tenesmus and diarrhœa increase and are attended with loss of appetite and great emaciation.

Diagnosis.—The findings of the tubercle bacilli, together with the presence of giant cells in the tissues from the base of the ulcer, are the essential characteristics.

Treatment.—Antiseptic irrigations, with special attention to general treatment, is the best that can be done. Good results have followed appendicostomy in several cases that have been reported.

Acute Tubercular Proctitis.—I reported (*Maryland Medical Journal,* 1887) three necropsies in which this very interesting condition existed. It was while working under Dr. William T. Councilman at Bayview Alms House, that he demonstrated the cases to me. Later, in 1899, I reported (*Baltimore Medical College Alumni Journal*) two clinical cases of the same condition which I saw and treated.

The condition as found in the rectum is characterized by swelling of the mucous membrane, intense hyperæmia, and numerous small ulcers. The microscopical appearance of the ulcers in the three cases in which autopsies were made offered many points of interest. In most cases anatomic tubercles were found in or about the ulcers. There was an intense small-cell infiltration of the mucous and submucous coats. Many of the glands of Lieberkühn were filled with cells.

Where the small-cell infiltration was greatest, the tissues did not stain brilliantly and appeared as if in the condition of beginning caseation. Some of the cells were large, pale, and epithelioid, similar to those filling the alveoli of the lung in caseous pneumonia. In a few sections well-defined tubercles with giant-cells were found, and sometimes aggregations of small cells with a caseous centre. On staining the sections for tubercle bacilli, enormous masses of these were found in the edges of the ulcers. In some places they were found in the infiltrated mucous membrane, where as yet there was no breaking down and where the small-cell infiltration was the only pathological condition. Where found in greatest abundance, caseation and destruction of tissue accompanied them.

This condition of the rectum seems to be an important point, for it shows that the tuberculous process in mucous membranes, as well as in the lungs, can advance independently of the formation of miliary tubercles. It is interesting to note also the similarity between the large cells found here and in caseous pneumonia. In the rectum, in these cases, just as in the lung, we have to do with an inflammation on which a specific character is impressed by the presence of the bacilli. Here is one of the clinical cases of acute tubercular proctitis seen by me :

H. G., age sixteen, American. Urinary analysis normal; came into the Maryland General Hospital, May 26, 1899, complaining of a burning in the rectum, with an inflamed tag at the anal orifice. Family history good, no tuberculosis having been present. Physical examination of the chest by Dr. O'Donovan showed nothing abnormal; no cough, or fever. Upon examination into the rectum with a speculum, I found the mucous membrane very red, inflamed, and discharging pus. I suspected gonorrhœal proctitis, at the same time recognizing the same appearance as seen in the rectum of the three cases of acute tubercular proctitis I have mentioned. The redness of the mucous membrane was marked; it was granular and looked like a piece of red flannel. I ordered the pus examined

for gonococci, with negative results, but tubercle bacilli were found in great abundance; subsequent examinations confirmed this diagnosis. I ordered injections of a saturated solution of boracic acid three times daily; subsequently used injections of a solution of sodium chloride. He left the hospital June 18, 1899, entirely relieved, with no tubercle bacilli to be found in the discharges from the rectum. He was ordered to report again at the hospital, if he had any return of the local trouble, or if he had any general sickness. He had not done so up to October, 1899.

Dysenteric Ulceration.—This is an acute specific inflammation of the solitary glands and follicles of the large intestine, which if unchecked soon results in ulceration. While it may occur throughout the large intestine, yet in a large majority the ulceration is found in the rectum and sigmoid and often confined to these localities.

ETIOLOGY.—Dysentery is now generally admitted to be due to a specific micro-organism. Three types of the disease exist, the amœbic, the bacillary, and that due to a mixed infection, which might be classed as simple ulceration. The term *catarrhal dysentery* is no longer recognized.

The amœbic and bacillary forms are not confined to tropical climates, as formerly supposed, but are frequently found in the temperate also.

BACILLARY DYSENTERY.—This type is due to infection by the Shiga bacillus (Bacillus dysenteriæ) or one of its prototypes, and Shiga describes the bacillus as a short rod with rounded ends, much resembling the Bacillus typhosus, or the greater portion of the colon group. By what means it gains admission to the intestinal canal is not yet definitely known.

Symptoms.—It is frequently ushered in with a chill, rise of temperature, griping abdominal pains, tenesmus, and a burning in the rectum. The stools, at first mushy, then watery, are finally composed almost entirely of mucus and blood. Frequently there is nausea, and collapse often comes on early in the course of the disease; emaciation is very rapid.

The constitutional symptoms are due to toxins produced by the specific bacilli and not by the bacilli themselves. No report of the proctoscopic findings in this form of dysentery have been made. The autopsies, however, show the infection to be superficial, and the area of infection large; the ulcers to assume an irregular form and the lesions in the acute stage to be confined to the lower portion of the colon. The ulcers in their chronic form show a decided tendency to contract upon healing. Convalescence is very slow and relapses very frequent.

Treatment.—A large dose of calomel gr. x, with bicarbonate of soda, should if possible be given early in the disease; this to be followed in six hours by one ounce of castor oil. When this has acted well, give rectal irrigations of warm unirritating antiseptic solutions every four or five hours.

Shiga has had very good results from the serum treatment. According to Dr. Eldridge, up to November 1, 1899, he treated the following number of cases with serum: In 1898 in Laboratory Hospital, 65 cases; death-rate, 9 per cent.; 1899, in Laboratory Hospital, 91 cases; death-rate, 8 per cent.; 1899, in Hirowo Hospital, 110 cases; death-rate, 12 per cent. During the same period of 1899 there were under ordinary treatment at Tokyo, Honjo Hospital, 166 cases; death-rate, 37.9 per cent.; at Hirowo Hospital, 53 cases; death-rate, 37.7 per cent.; at Komogome Hospital, 398 cases; death-rate, 34.6 per cent.; in private houses, 1119 cases; death-rate, 28.5 per cent. With the use of the serum it will still be necessary to give the constitutional treatment and the rectal irrigations.

AMŒBIC DYSENTERY.—This form of ulceration is due to infection by amœba dysenteriæ. Musgrave and Clegg succeeded in cultivating amœbæ from different sources, and among the most striking peculiarities of these amœbæ is that of not growing except in connection with other organisms (symbiosis). Neither the two authors named, nor any one else as yet, have been able to get pure cultures of amœba without a symbiotic micro-organism. A micro-organism is indis-

pensable to the propagation of these protozoa. Not only must they have growing in connection with them a micro-organism, but it must be of a character with which they may affiliate; in other words, they have a selective power for special bacteria, this selectiveness being particularly marked in amœbæ from the human intestine, and a fact equally true whether they have been brought to these places by natural means or by experiment. Nor need they necessarily be a pathogenic organism, although those most frequent found associated with them in amœbic ulceration of the intestines are the colon bacillus, the Spr. cholera, and the Bacillus typhosus. The distribution of amœbæ and the source from which they may be obtained have been found to be very general—the soil, both surface and deep, marshes and stagnant water, air, grasses, and fruits. While all amœbæ from the above sources have heretofore been looked upon as non-pathogenic, yet Musgrave and Clegg have succeeded in producing amœbic dysentery from some obtained from these sources. nor have they been able to discriminate morphologically, or from their culture, any difference between the pathogenic and non-pathogenic varieties.

An unusual form of amœbic dysentery is reported by Harry T. Marshall, of Charlottesville, Virginia, the specimen shown being obtained from a male Filipino who died from intestinal hemorrhage after being ill but ten days or two weeks:

The whole colon was studded with nodules up to 12 or 15 mm. in diameter, the tops of some being necrotic. Microscopically the mucosa over the nodules was lost and fibrin and leucocytes extended into the submucosa. The nodules contained many amœbæ, but no bacteria. I have found no other specimen of this type, even in museums, and but few writers mention such a condition. I regard it as an early case which lacked the extensive necrosis and ulcer formation so commonly seen.

CHARACTER OF THE ULCERATION.—In the chronic form, when the ulcers are well defined, they are single and retain individuality even when clustered; they are raised above the

level of the mucous membrane, with a yellowish centre, which is slightly depressed, very much resembling miniature prairie-dog mounds; the surrounding mucous membrane is red and inflamed. The yellow gelatinous mass which forms the centre of the ulcer contains the amœbæ, and there is excessive secretion of mucus.

LOCATION OF THE ULCERS.—Most authors affirm the cæcum and ascending colon to be the chief sites of the lesions, and most likely their opinion is based upon the findings at autopsies. The rectal specialist, seeing these cases during life through the proctoscope, finds in nearly every case the ulceration in the rectum and sigmoid, and in the average case there are no symptoms in the cæcum and ascending colon to attract his attention. In aggravated cases, especially those that have had frequent remission, they extend to the cæcum, or rather that has been the primary location, and this doubtless accounts for the remissions and explains the rapid recovery following antiseptic irrigations through the appendix, even after having resisted, for a long time, similar irrigations per rectum.

DIAGNOSIS.—While the description of the ulcers given above is very characteristic, the only reliable diagnostic sign is in finding the amœba, and the only accurate method of doing this is by examining the scrapings taken directly from the ulcers and examining them immediately under the microscope.

Symptoms.—There may be slight elevation of temperature, which is likely always to be present in acute cases, tenesmus, frequent stools with the discharge of mucus and pus, and which are sometimes streaked with blood. Various writers have pointed out that amœbic infection may exist in a latent form and prove fatal from complications without noticeable diarrhœa and sometimes even with constipation. Severe constitutional symptoms are rare, except by involvement of the liver with amœbic abscesses. There is likely to be considerable

emaciation. A leading characteristic is irregularity in course; for it is made up of intermissions, relapses, and exacerbations.

Treatment.—Let all efforts be directed towards eradicating the disease by local measures, as by frequent antiseptic irrigations, certain of which have been found to have a specific action on the growth of the amœba. Musgrave and Clegg found that amœbæ grow very slowly at the temperature of the ice-box, but have been unable to verify the usual statement that these amœba always lose their motility at or below 75° F. in stools, and certainly such is not the case in cultures. Kreuse and Pasquale were able to produce dysentery in cats by using fæces containing amœbæ which had been frozen and thawed, and from this they inferred that dysenteric amœbæ are probably not destroyed at a temperature somewhat below o C., hence the temperature of the irrigations need not be regarded.

Among the solutions for irrigation which have been found most efficacious are, first, quinine from 1 to 300 to 1 to 1000, which according to Musgrave and Clegg cause the amœbæ to become encysted, and only scant growths of amœbæ were obtained from the emulsion ten minutes after the quinine solution had been added. According to the same authors, solutions of formalin 1 to 1000 were only partially successful, the parasites becoming quickly encysted, but in twenty-four hours a small number of amœbæ developed from transplants. Clinically Dr. John J. Jelks, of Memphis, has used the solution of formalin with great success, using as strong a solution as 1 to 500, adding to the solution the same proportion of pure carbolic acid. He thinks the addition of the acid lessens the irritation from the formalin. He uses this irrigation once a day and continues to do so from one to two months. Solutions of nitrate of silver from ½ to 1 per cent. used every alternate day for several weeks have been found very beneficial. If the use of either or all of these remedies fails to relieve the patient at the end of six or eight weeks, or if after getting better there are recurrences, it is well then to resort to valvular cæcostomy, or appendicostomy, without delay. The

diet should be principally nitrogenous, and of a mild unirritating character; the patient should be confined to bed.

The need for cæcostomy, or appendicostomy, in the obstinate and chronic cases is due to the fact pointed out first, we think, by Rogers, that the cæcum and ascending colon are frequent sites of these lesions. Irrigation of these parts of the large intestine through the rectum is impracticable and decidedly inefficient, for physical causes, it being impossible to flush thoroughly the blind end of any canal. The reasonable objections to the usual colostomy opening, which was formerly used for this purpose, have been overcome; first, by the suggestion of Dr. Gibson through his operation known as valvular cæcostomy and secondly, by the suggestion of Dr. Robert F. Weir of using the appendix for the purpose of irrigating the intestinal tract below this point. In view of the eminently satisfactory results of irrigation through either of these openings, the ease and safety with which the openings can be closed and the absence of leakage of the intestinal contents, we do not hesitate to recommend one of them in every case of obstinate amœbic ulceration that has failed to respond to the usual methods of local treatment through the rectum. Cases of venereal, dysenteric, and tubercular ulceration of the large bowel have been successfully treated by this method; also a variety of cases due to autointoxication of intestinal origin.

VALVULAR CÆCOSTOMY.—This operation was devised prior to appendicostomy and, while the latter may be more attractive and at first sight appear easier to perform, there are a number of objections to appendicostomy that make cæcostomy the operation of choice. Some of the objections that are urged against appendicostomy are that the lumen of the appendix is frequently obliterated, and its position at the end and lower portion of the caput coli necessitates such traction upon it in order to bring it out through the abdominal opening that its circulation is often interfered with to such an extent as to cause sloughing of the entire appendix, even where the appen-

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diceal artery has not been tied. The conditions that favor cæcostomy are that the portion of the cæcum to be opened is directly in contact with the anterior abdominal wall, where the external opening is to be made; that the opening in the cæcum may be made directly opposite the ileocæcal valve through which a tube can be carried for the purpose of irrigating the ileum, and the leakage from the cæcum can be controlled equally as well as when the appendix is used.
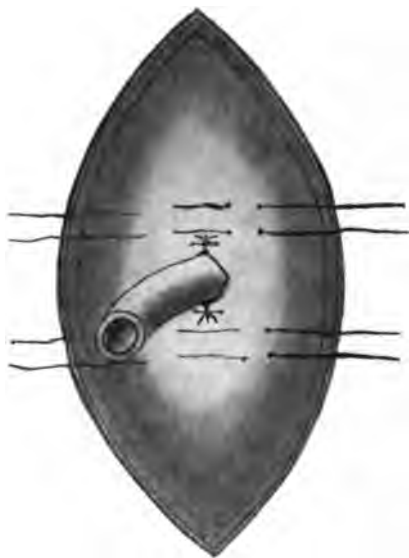
FIG. 37.—Gibson's method showing catheter introduced into the cæcum.

Dr. Gibson's method (*Boston Medical and Surgical Journal*, Vol. cxlvii, page 341) is as follows: An incision one and one-half inches long is carried through the abdominal wall parallel with Poupart's ligament on the right side, and one inch internal to its outer part. The cæcum is found directly beneath, and presents itself in the opening. A point is chosen in its anterior band and the intestine is opened sufficiently to admit a fair-sized soft rubber catheter (Fig. 37). Three tiers of sutures placed above and below this orifice serve to

infold the cæcal wall. The ends of the last sutures introduced are left long and are carried through the margins of the abdominal incision; these when drawn tight bring the cæcum forward into close·contact with the abdominal wall, and are further utilized to close the external wound, being reinforced by a silkworm-gut suture in each angle (Fig. 38). The catheter is left in until the seventh day, after which it is reintroduced at the time of each irrigation; the latter is begun
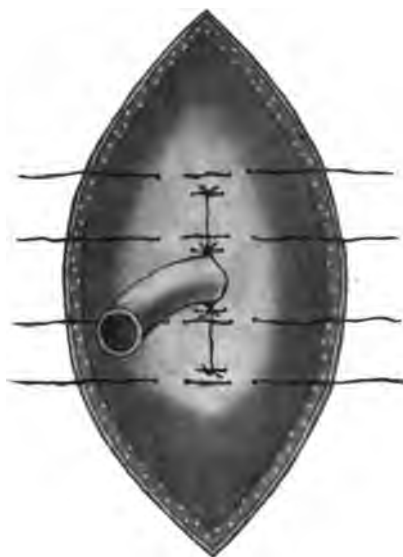
FIG. 38.—Gibson's method showing the wound closed with catheter in the cæcum.

about the second or third day after the operation. There is absolutely no leakage from this opening when the catheter is out, nor is there any difficulty attending its reintroduction; the wound readily closes of itself, after the use of the catheter is stopped.

Samuel G. Gant, of New York, has devised what he believes to be a new and effective way of irrigating both the small and large intestine through the same opening in the cæcum—an operation which he designates *Cæcostomy with an arrange-*

ment for irrigating both the small intestine and colon (New York Medical Journal, Aug. 15, 1908). Gant believes his cæcostomy to be superior to that suggested by Gibson, because the technic is equally as simple, the operation requires no more time, there is less leakage owing to the purse-string suture being substituted for his lateral infolding sutures, both the small and large bowel can be irrigated by the attendant or patient, a firmer support is obtained by attaching the cæcum to the transversalis fascia than when it is stitched to the parietal peritoneum, and the opening heals spontaneously after the catheters are removed.

The following is a brief description of his method with his special appliance for the purpose (Fig. 39):

First Step.—Through a two-inch intermuscular incision made directly over the cæcum it and the lowermost part of the ileum are withdrawn, and the edges of the wound covered with sterile gauze handkerchiefs.

Second Step.—The cæcum is scarified and clamped with rubber-covered forceps to prevent soiling the wound when the bowel is opened (Fig. 40, C).

Third Step.—Four lines of silk seromuscular purse-string sutures are inserted in the anterior wall of the cæcum, at or outside the longitudinal band directly opposite the ileocæcal valve (Fig. 40, F), when the bowel is quickly opened inside, the suture line by using the knife for the outer coats and scissors for the mucosa.

Fourth Step.—The bowel is grasped at the juncture of the large and small intestine, and is held in such a way that the ileocæcal valve rests between the thumb and fingers of the left hand (Fig. 40). A Gant enterocæcal irrigator (Fig. 39[2] or catheter carrier Fig. 40, B) is then introduced through the incision, and carried directly across the cæcum, and then quickly guided through the ileocæcal valve into the small intestine by the aid of the thumb and fingers, placed there for this purpose (Fig. 40).
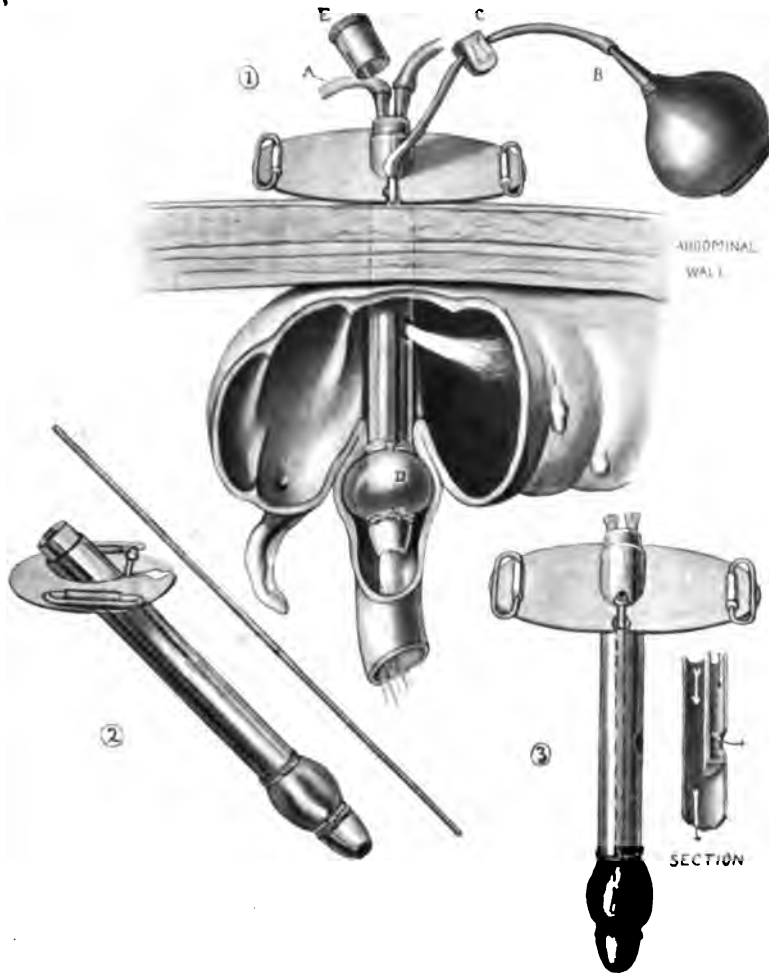
Fig. 39.—Steps showing Gant's cæcostomy, which provides for irrigation of both the small and large intestine. 1. Shows apparatus in position. 2. Side view of Gant's enterocæcal irrigator. 3. Front and sectional view of the same. (a) Irrigating tube. (b) Inflating attachment. (c) Clip for closing same. (d) Shows inflating bag distended with air to prevent return of solution into the cæcum. (e) Cover for irrigator. The celluloid rod shown on the right of (2) is used as a guide for removing and the reintroduction of the irrigator when it becomes necessary to change the inflating bag.

Fifth Step.— The inflating-bag (Fig. 39, D) on the end of the irrigator is then distended in order to hold the irrigator in place until the purse-string sutures are tied.

Sixth Step.—The clamp is now removed from the cæcum and the purse-string sutures are tied (Fig. 40, F) ; this inverts
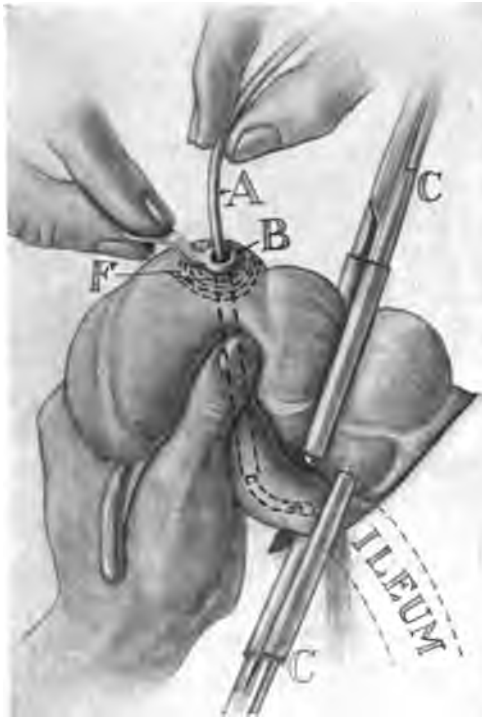
Fig. 40.—Showing the different steps in Gant's cæcostomy, in which either the rubber catheter or his special apparatus can be used. *A*, catheter; *B* catheter-carrier; *C*, rubber-covered clamps; *F*, four rows of purse-string sutures.

the edges of the bowel about the tubes, each stitch in its turn causing a still further circular infolding of the bowel, together forming a cone-shaped valvular projection all around the irrigator, which effectually prevents the escape of the fæces.

Seventh Step.—The cæcum is scarified and anchored to

the abdominal wall by through-and-through suspension sutures, or by chromicized catgut stitches, which include the transversalis fascia. The wound in the abdomen is closed by the layer method, after which the metallic plate is held close to the abdominal wall by tapes passed around the body and attached to the holders at each end of the plate.

REMARKS.—In order to avoid the danger of infecting the wound, irrigation is not begun until the second day, unless there is some special reason for greater haste.

After the diarrhœa or ulceration has been cured, and when spontaneous healing permits the withdrawal of the irrigator, the opening may be closed by cauterizing the mucous surfaces, or by taking several sutures under local anæsthesia without entering the peritoneal cavity.

In the absence of the special mechanism for doing Gant's cæcostomy, two pieces of catheter, one for the cæcum and one for the ileum, may be substituted for the irrigator, in which case it is necessary first to introduce a Gant's catheter-carrier. (Fig. 40, B.)

Gant has obtained some wonderful results in the treatment of anæmia by means of small and large intestinal irrigation, and is satisfied that attacks of typhoid fever could be shortened and made less severe by this operation, and that patients suffering from ptomaine poisoning and cholera could likewise be benefited.

The technic of Weir's operation for appendicostomy as modified and given by Tuttle in a paper read before the Surgical Section, New York Academy of Medicine, May, 1905, is as follows: An incision one and one-half inches long is made at McBurney's point, the intermuscular method being used. The appendix having been found and brought out to the surface, its artery is tied (I do not approve of tying the artery) and the mesentery stripped down to its juncture with the caput coli; a suture is then passed at the lower angle of the wound through the peritoneum, then through the muscular walls of the cæcum at its juncture with the appendix,

and back through the peritoneum on the opposite side of the wound; a second suture is then passed about half an inch above the other through the same tissue, but on the upper side of the appendix (Fig. 41). These two sutures being tied the peritoneum is closed by continuous suture, and the wound in the usual manner, the skin being sutured accurately but not too tight. The patulousness of the appendix should be definitely determined before closing the abdominal wound.
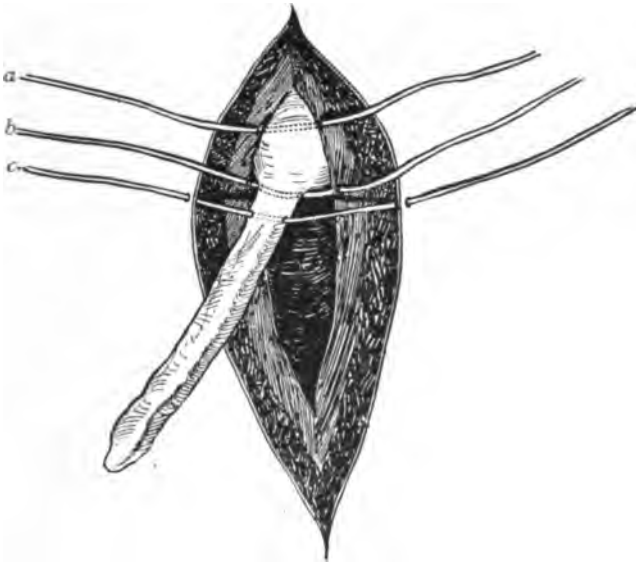
Fig. 41.—Tuttle's modification of Weir's appendicostomy. a, b, sutures fixing cæcum to parietal peritoneum; c, sutures fixing appendix to skin. (Tuttle, Amer. Jour. of Surgery.)

If there is any real reason to doubt its patulousness, we think it better to cut off the end and tie in a very small catheter before closing the peritoneal cavity (Fig. 42).

Gant has devised a special irrigator (Fig. 43) to be used in such emergencies, and advises that it should always be used and that it should be made the rule to open the appendix at once. The author is quite in accord with this practice.

There is very little risk in this, and it gives the surgeon the advantage of performing a valvular cæcostomy at once

if the appendix proves to be impervious. It is better to delay the irrigations four or five days after the operation, on account of the liability to infect the wound. Irrigations through either of these openings are very easily accomplished through the catheter. A No. 12 French soft-rubber catheter is the size used for introducing into the appendix. This can be left in continuously for several weeks, but as soon
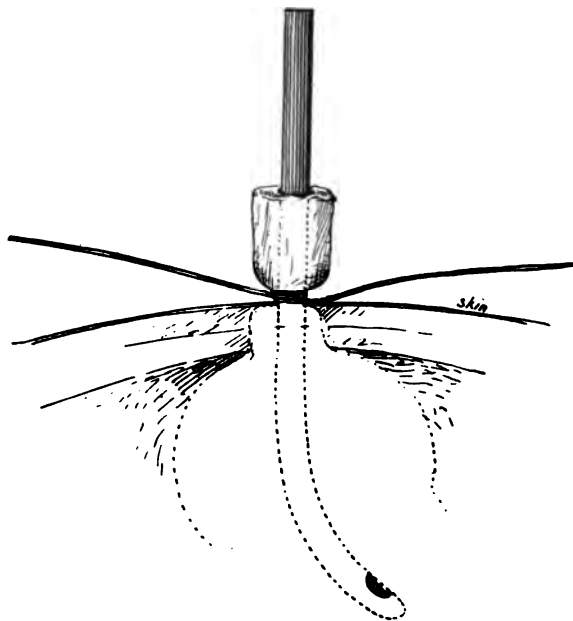
FIG. 42.—Showing catheter in position and ligature which tied around the stump of the appendix, prevents leakage and eventually amputates it. (Tuttle, Amer. Jour. of Surgery.)

as the rubber becomes hard from the secretions it is likely to irritate the opening and a fresh one should take its place; or when such irritation occurs from the catheter it can be left out, to be inserted at each irrigation. Gant also makes the following suggestions: The solutions for irrigation to be used through these openings are similar to those that have been recommended for use in the rectum. While allowing the solution to run in through the appendiceal
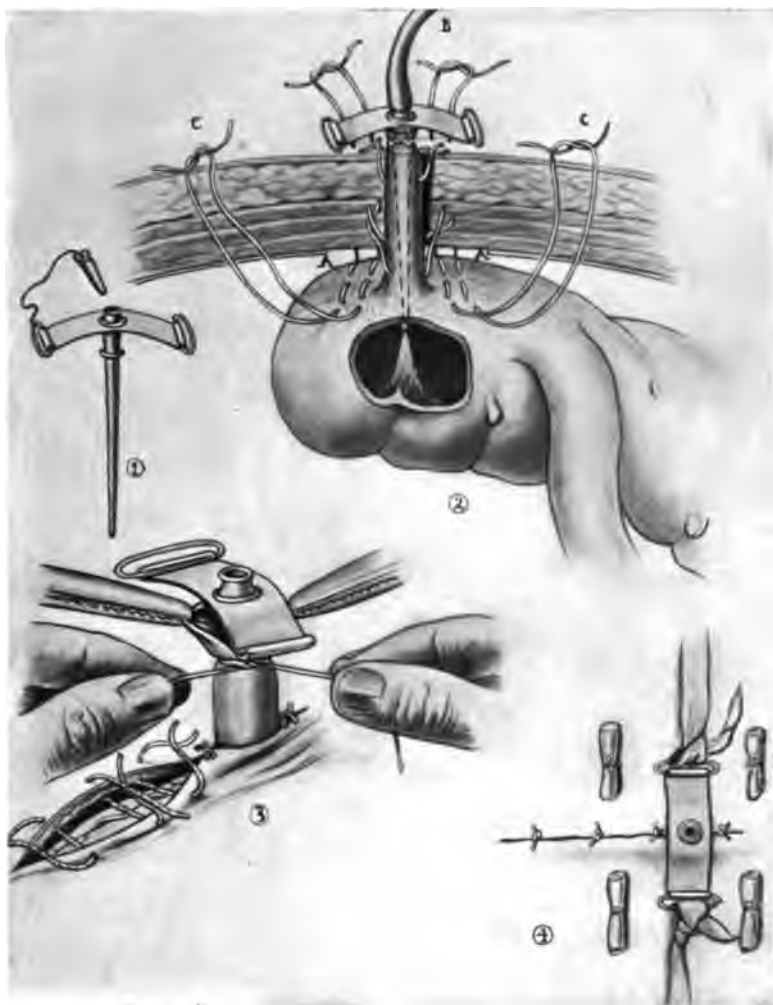
FIG. 43.—Steps showing Gant's appendicostomy which provides for immediate irrigation of the bowel in cases of ulcerative colitis. 1. Gant's appendiceal irrigator. 2. Cæcum and appendix in position. 3. Method of ligating the appendix about the irrigator and closure of the wound. 4. Shows the irrigator in place and the attached pieces of tape which pass around the body and retain it in place while tied and also the rubber tube across which the suspensory stitches CC are tied. A, shows peritoneum removed and the gut being brought in contact with the transversalis fascia. B, tube attached to irrigator. C, suspensory sutures which attach the scarified cæcum to the abdominal wall.

opening the patient is to be placed on a bed-pan and a nozzle of a syringe, or a rectal irrigator, introduced into the rectum so that water may pass out directly without being allowed to distend the rectum and give rise to straining. Irrigations can be used to advantage several times during the twenty-four hours, as it keeps the bowel free from accumulation of the organisms and is attended with so little distress to the patient. With few exceptions improvement in the patient's intestinal symptoms almost immediately follows the irrigations through one of these openings, and a cure is generally effected in from three to four weeks.

Closure of these Openings.—These openings have a tendency to close themselves whenever the catheter is left out for any length of time, but should they fail to do so after a reasonable length of time, and the patient wishes it, closure can be readily done by cauterizing the opening with a thermo or electric cautery. As the annoyance from either of these openings is so very slight, and the liability for recurrence is so great, I have generally recommended that they should be kept open indefinitely. I had a case that remained well for three years after closure of the opening, who subsequently had a recurrence and died from it. Trichomonas intestinalis were found in great numbers in one case treated by me through the appendiceal opening after the amœba had disappeared.

ULCERATION DUE TO MIXED INFECTION.—The character of the ulceration from this infection is very similar to that from the bacillary type, except that the symptoms are not as a rule so acute or violent.

Pathology.—The pathogenic organism found in this form of ulceration is usually the colon bacillus.

Treatment.—This is similar to that recommended in the bacillary type.

VENEREAL ULCERATION OF THE ANUS AND RECTUM.— While this form of ulceration is not very frequent in the United States, as the direct result of transmission through the practice of sodomy and pæderasty, yet quite frequently it

results from autoinfection. The chief varieties are gonor-
rhœal, chancroidal, and syphilitic.

GONORRHŒAL PROCTITIS AND ULCERATION.—This form
resembles acute catarrhal proctitis so closely that it can only
be differentiated by the presence of the gonococcus to which it
is due, and by the presence of which it is diagnosed.

Most of the cases reported have been in the female and
are secondary to an infection of the genital tract, although
Lockyer (Dr. Alfred J. Zobel, San Francisco, California)
asserts on the contrary that gonorrhœa of the anus and rectum
is very rare in women, and further asserts that direct contact
of the pus with the deeper parts of the anal canal is necessary
for infection.

Gonorrhœa in the male is almost always the result of
sodomistic practices and is therefore generally of the primary
type.

Dr. Zobel reported at the annual meeting of The Proc-
tologic Society, June 7, 1909, three very interesting cases of
primary gonorrhœa in the male, all of which resulted from
sodomy.

Symptoms.—At first there is heat and itching about the
anus, which may appear from two to seven days after exposure
to the infection; these symptoms are soon followed by acute
pain, burning and tenesmus in the rectum, with frequent and
painful defecation and with the passage of mucus and pus,
which is sometimes tinged with blood. There is likely to be
some rise of temperature. Upon inspection the mucous mem-
brane is found to be bright red and swollen, and as the disease
progresses patches of ulceration appear; these are very super-
ficial, with a granular base. After the disease has continued
for some time the above symptoms are likely to be complicated
with condylomata, fissure, and submucous fistulæ. While the
diagnosis in the early stages depends upon the presence of the
gonococcus, Blake and Shuldham have called attention to the
fact that "when gonorrhœa has reached its chronic stage,
we may fail to find the diplococci, or true gonococci, but

encounter instead pseudogonococci, staphylococci, streptococci, or tubercle bacilli." When such is the case, we have to rely on general symptoms, the history, and the exclusion of other similar inflammatory conditions, as, for instance, the absence of tubercle bacilli.

Prognosis.—While the condition is quite obstinate to treat after it has extended well up into the rectum, yet under prompt and efficient measures it will yield to treatment, except where there is tuberculosis or constitutional syphilis.

Treatment.—Antiseptic solutions should be used often and freely, such as a solution of the bichloride of mercury, 1 to 10000; solutions of nitrate of silver, ¼ to ½ of 1 per cent.; or solutions of argyrol and permanganate of potash, any of which will rapidly destroy the gonococci. They should be used through a return-flow catheter, and irrigations should be repeated at least three times daily. If there are condylomata they may be clipped off, and the parts kept dry with a dusting-powder of boracic acid, calomel and bismuth. If there is a gonorrhœal vaginitis in the same subject, it should be treated by the same method, in order to prevent reinoculation. The irrigations should be continued for eight or ten days after the discharges cease.

CHANCROID OF THE ANUS.—This form of ulceration is not uncommon among the lower classes, influenced very much by their uncleanly habits. It is much more frequent in women than in men, due to autoinoculation from the genitals, from probable contact with the diseased male organ, and the greater frequency of sodomy than of pæderasty. This form of ulceration is generally limited to the perianal region and the anal canal.

Etiology.—It is not yet definitely settled whether the chancroid ulcer is due to simple pyogenic organisms, or to a specific germ. Where the ulcers appear on the surface around the anus, they are likely to be very superficial and have very few characteristics of a chancroid. When they exist in the anal canal they resemble a fissure very much, especially in

the amount of pain accompanying them; they are distinguished
from fissure by frequently being multiple, bright red in color,
secreting a large amount of pus, and being frequently sec-
ondary to chancroids of the genital organs.

Treatment.—Frequent irrigations with antiseptic solutions,
especially a solution of formalin, ½ dram to 1 pint, and the
sore should be dusted with equal parts of calomel and oxide
of zinc.   If the pain continues it will be well to resort to
forcible dilatation of the sphincter, or to incise it on either
side and dissect out the scar tissue.   After this is done, we
should continue the antiseptic irrigations and the dusting-
powders, keeping the evacuations soft and regular.

CHANCROIDAL ULCERATION OF THE RECTUM.—This is
very rare and is generally the result of sodomy, or pæderasty.
The phagedenic variety, with its persistent tendency to spread,
is more likely to extend from the anal orifice up into the
rectum.

Symptoms.—The symptoms of chancroid of the rectum
are similar to those of simple ulceration, namely, diarrhœa,
tenesmus, pain, and a profuse discharge of pus, tinged with
blood.   The ulcers are irregular in shape, with ragged borders,
and grayish in color.   Any chancroid may assume a phage-
denic type, due to constitutional conditions.

Treatment.—This is likewise similar to that for simple
ulceration, except that more stimulating applications are
required, and when there is a tendency to spread pure carbolic
acid or the actual cautery should be applied to the ulcer.
When the chancroid assumes a phagedenic type, in addition to
the local applications recommended above, the patient should
be well supported by a nourishing diet, stimulants, and good
tonics.

Complications.—A chancroid of the anus or rectum may be
complicated with a true Hunterian chancre in the same lesion,
or the chancroid may exist in connection with secondary
syphilis.   The physician should be careful, however, not to

confound syphilitic ulcers and broken-down mucous patches with chancroids. Subtegumentary fistulæ are also likely to complicate chancroids, and when they exist they should be freely opened and cauterized.

Syphilitic Ulceration.—This highly infectious form of ulceration may show itself in the skin around the anus, in the anal canal, or in the rectum, either as primary, secondary, or tertiary lesions. The primary lesion, which is always a chancre, may appear in or around the anus, or in the rectum, is more frequently met with than has been supposed, and is
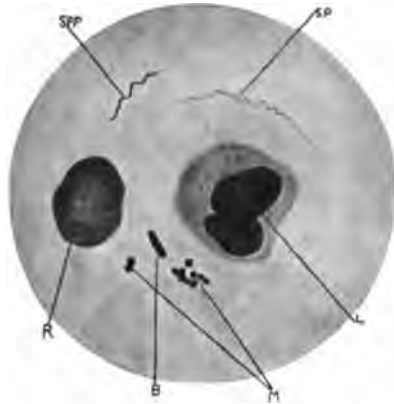
FIG. 44.—Spirochæte pallida from anal condyloma. (Sir Charles Ball's "The Rectum.")
SP, Spirochæte pallida; *SPP*, Spirochæte pseudo-pallida; *L*, leucocyte; *R*, red blood corpuscle; *B*, bacillus; *M*, micrococci. (Drawn with camera lucida from smear preparation Teishman's stain, by Dr. H. J. Wright, I.M.S. House Surgeon, Sir Patrick Dun's Hospital.)

much more frequent in women than in men. Wherever it may appear, its pathognomonic characteristic is the induration of its base, which is not very pronounced before the expiration of ten days or two weeks. The differential diagnosis may be made before this, by finding the *Spirochæta pallida* (Fig. 44). A simple hard chancre may also assume a phagedenic type. When the chancre is located in the anal canal, or on the surrounding skin, the inguinal glands on both sides become enlarged. A patient may have a true chancre without having any secondary symptoms, or they may be so slight as to pass

unnoticed, yet they may show tertiary symptoms years after. These cases indicate that the systemic resistance at the time was sufficient to hold in abeyance the virus of the disease, but the seed of constitutional infection remained latent and at some period of depressed vitality overcame the resistance and developed with great intensity.

Chancre of the rectum is very rare, and its existence is very positive evidence of the practice of sodomy, although it may be possible for the infection to be carried into the rectum by the nozzle of a syringe or some such means. The symptoms are similar to those of simple ulcer of the rectum, and the treatment is the same.

Secondary manifestations of syphilis show themselves on the skin surface around the anal margin, in the form of mucous patches, which are merely transformed macular, moist papules, due to the moisture and continued contact of the parts causing the skin to break and the exposed raw surface to ulcerate. These papules may be single, but are generally multiple, and the secretion from them is very fetid and irritating. Mucous patches are rare within the rectum, but not so rare as is generally believed.

SECONDARY ULCERATION OF THE ANUS AND RECTUM.—It is difficult to draw the line between secondary and tertiary ulcerations of the anus. Lesions ordinarily considered to be secondary may make their appearance years after the primary sore. In such a case an ordinary abrasion may take on the characteristics of syphilitic ulceration. These ulcerations are by far the most frequent manifestations of syphilis that occur above the anorectal line. They occur as crater-like ulcers, single or multiple, with clean-cut indurated edges; they rarely extend deeper than the submucous tissue in the early stages; subsequently they may become very extensive and be attended with great destruction of tissue. The sacral glands become enlarged and the walls of the rectum beneath the ulcers feel leathery and indurated. The odor is fetid and disgusting, but very distinct from the discharge attending carcinoma.

From the irritation and infection of these discharges there may be developed extensive ulceration about the anus. Even though these ulcerations may have reached a very destructive stage, they may be induced to heal by careful local and general treatment, but they are almost sure to be followed by stricture of the rectum, due to fibrous infiltration that always attends this form of ulceration.

Treatment.—This consists of cleanliness, good drainage (which must be secured even at the expense of forcible dilatation or incision of the sphincter, and by keeping in a drainage tube), local antiseptic applications, and the administration of mercury.

Tertiary Lesions.—These are principally gummata, destructive ulceration, anorectal syphiloma, and proliferating proctitis. The following are some of the characteristics of these tertiary lesions of the rectum that should be borne in mind, namely: They develop at no regular time after the initial lesion, and may never appear at all; they are likely to recur; they involve the deeper tissues, are destructive, upon healing leave cicatrices, do not yield readily to mercury, are very contagious, and are nearly always autoinoculable, showing that they are due to a mixed infection.

GUMMATA.—When these occur in the rectum, it is as a round, elastic and painless deposit in the submucous tissues; later they may involve both the mucous and muscular walls of the gut, and may be either single or multiple. If they do not break down and ulcerate, they do not produce any permanent stricture of the rectum.

One of the most frequent manifestations of tertiary syphilis about the anus is a dry, brittle condition of the mucocutaneous tissue. It is similar in appearance to the condition of the same parts that attends atrophic catarrh.

DESTRUCTIVE TERTIARY ULCERATIONS.—These result from traumatism, disintegrating gummata, and necrosis of tissue, due to endarteritis obliterans.

ANORECTAL SYPHILOMA OF FOURNIER.—Fournier (Lesions tertiaries de l'anus et rectum, Paris, 1875) describes under the above heading a specific fibrous infiltration of the rectal walls. He states that it is a hyperplastic proctitis, with a tendency to sclerotic change, as is seen in the kidneys and other organs in late syphilis. It begins in the submucous tissue.

PROLIFERATING PROCTITIS.—Paul Hamonic has described what he considers a peculiar syphilid, under the title of " Rectitis Proliferante Syphilitique " (*Anual Med. Chir. Trans. France et etrang.,* 1886, Vol. ii, page 31). It consists of a growth of fragile villose prolongations, of feeble resistance, from the mucous membrane of the rectum. Kelsey and Tuttle have each reported cases of this character.

Treatment.—The treatment of tertiary forms of syphilis of the anus and rectum consists in the administration of the iodides and the use of mercury by inunctions, or hypodermically, and by the local use of antiseptic washes and dusting-powders composed largely of calomel. After the ulcerations have healed rectal bougies should be introduced every alternate day to prevent contraction.

Congenital Syphilis of the Anus and Rectum.—The appearance of this form of this disease in this locality is among its earliest manifestations, and may occur at any time after birth up to several years of age. It appears first as erythema around the anal margin; the skin is at first slightly pigmented, red, or copper-colored, but soon becomes thickened and elevated, after which a seropurulent fetid discharge exudes from it.

Under the influence of cleanliness, with antiseptic washes and powders, this discharge is soon checked, but the diseased skin and mucous membrane becomes very friable, and shallow fissures make their appearance between the anal folds. Other symptoms will soon make their appearance, but the above are so typical that one need not wait for the appearance of these subsequent symptoms before instituting antisyphilitic treatment, which would do little if any harm to the child though

the diagnosis of syphilis might be wrong. Gummata may also exist as a congenital symptom of syphilis of the rectum. Notwithstanding the fact that the majority of cases of syphilis in the new-born are hereditary, one should always bear in mind the possibility of its being acquired.

Treatment.—The ·iodides with cod-liver oil and mercury by inunctions. The local treatment consists in the use of antiseptic washes, with a dusting-powder composed of equal parts of calomel and talcum powder N. F.

DIPHTHERITIC ULCERATION.—A diphtheritic ulceration of the rectum has occasionally been noticed in connection with its existence in the usual location of the body, as in the nasopharynx, and must be differentiated from membranous proctitis by the presence of the Loffler bacillus in the former.

Sir Charles Ball in his work on " The Rectum " (page 67) says: " As far as I know primary diphtheria of the rectum has not as yet been demonstrated bacteriologically."

Ulceration of the Rectum Due to Bilharzia Hæmatobia.— Frank Milton, M.R.C.S., Surgeon to the Kasr-el-Ainy Hospital, Cairo, delivered three lectures on this important disease, which appeared in *The Journal of Tropical Medicine,* 1902, Vol. v, pages 165. 191, 200, 213. He says that " the disease which is spoken of as bilharzia, and the chief symptoms of which are manifested through changes in the bladder and large intestine, is due to the deposition in the tissues of the eggs of a trematode worm, the Bilharzia hæmatobia, whose favorite habitat is the portal vein."

MODE OF INFECTION.—It is almost certain that water is the vehicle, and that infection is brought about by drinking, and by no other means. By far the commonest seat of " bilharzia " is the urinary bladder, and next in frequency of occurrence is in the rectum.

At the beginning of the disease we must, of course, have had bilharzia worms introduced into the body of the host, where they have established themselves and set to work to

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produce their eggs. The period of life and sexual activity of the bilharzia worm is not known, but it is probably of considerable duration, for cases have been recorded of patients who have ceased to inhabit countries where bilharzia is known to exist continuing to pass living eggs after years of residence under circumstances where reinfection would appear to be an impossibility. The eggs are 0.16 mm. in length and 0.06 mm. in breadth. They have a smooth surface and are readily recognized by their possessing a spine situated as a rule at one end, but which under certain conditions may be placed laterally, this latter occurring frequently in eggs deposited in the rectum, while the eggs recovered from the bladder invariably have their spine at the end. The eggs when laid by the female bilharzia are free in the blood-vessels and drift until they are arrested in some capillary whose calibre is too small to let them pass; this would seem to imply drifting against the current of the blood, as the eggs are produced in the veins where, of course, the current of blood is from small to larger. But I may perhaps be allowed to speak of drifting in the absence of any certain knowledge of how the eggs get from their point of origin in the larger veins to the smallest capillaries. That they do get there is certain, and that they do not make the circuit of the systemic circulation is also certain, and we must be satisfied with these two facts.

MODE OF EXIT.—As the life of the embryo has to be passed outside of the body of the host of the parent worm, nature directs the eggs towards the nearest point of exit from the body, and this will be the nearest surface from which they may be discharged; this is the mucous membrane of the bladder and rectum. As more and more of these eggs find their way into the capillaries, which are already obstructed by the earlier arrivals, areas are formed in which the eggs are found closely packed together and not only plugging the minute vessels but many will have made their way through the coats of the latter and lie in the surrounding tissue. These deposits of eggs, when they have increased in size sufficiently to be visible

to the naked eye, will appear as small pellucid bodies situated in the mucous membrane and raising its surface above the surrounding level. As these patches increase in size they coalesce with neighboring patches, until the whole mucous membrane becomes involved. As the patches increase in size they also increase in thickness, owing to the overgrowth of the surrounding tissue due to the irritation of the presence of the eggs, and also to the fact that nature striving to undo the mischief she has permitted for the sake of the propagation of the bilharzia species, tries to render the eggs harmless within the host by enveloping them in fibrous tissue and isolating them, as she does to foreign bodies imbedded in living tissue elsewhere. These two processes, the irritative overgrowth of the normal tissue and the formation of a new fibrous tissue, give rise to the formation of extensive raised patches of a yellow gray or brownish tinge with a granulated surface and of hard consistence, whose feel when explored by a sound soon becomes familiar and which is always pathognomonic of bilharzia. These patches when they have attained a certain age begin to lose their vitality, partly by mechanical interference with their circulation and partly by the contraction of the new fibrous tissue, and as a result they begin to break down and even to slough, giving rise to ulcers and crevices on their surface. This condition is frequently attended with great overgrowth of the normal structure of the mucous membrane, with formation of villosities, polypoid growths of great vascularity, and more solid coxcomb-like tumors, which are all equally typical of the disease (Sir Charles Ball, " The Rectum," Figs. 107, 108). These growths, although they are very plentifully supplied with blood-vessels, are all liable to necrosis and ulceration from blocking of their capillaries by the bilharzia eggs with which they swarm, and their disintegration, as well as that of the thickened patches, gives rise to the discharge of blood, pus, minute sloughs, and bilharzia eggs entangled in mucus. It has been stated that mature worms have been found in dilatation of the veins in these polypoid

growths, which would account for the enormous quantities of eggs and great overgrowth of tissue which occur in these cases.

As might be expected the lower end of the intestinal tract, surrounded by a large plexus of veins (which are connected directly with the portal vein, in which the worms are most commonly found) and affording all the conditions which would appear most desirable to the adult bilharzial worm, is very commonly the seat of its activities.

The excessive overgrowth in the normal structure in the mucous and submucous coats of the bowels previously spoken of, and which takes the form of polypoid adenomatous tumors, resembles somewhat ordinary hemorrhoids when the tumors appear near the anus, but within the gut and especially beyond the internal sphincter they differ materially from these latter. In the first place, in a given area they are infinitely more numerous than piles ever are, and instead of being rounded and smooth like hemorrhoids their surface is velvety from thickening of the mucous membrane itself, and their outline is broken up in all directions by the formation of secondary polypi, growing from their own surface and branching in all directions, until the large and fully-developed tumors bear a great resemblance to red branching coral. These tumors extend high up the rectum, beyond the reach of the finger, and this is so invariably the case that it would almost suggest the idea that the infection of the rectum begins from above in the neighborhood of the sigmoid flexure and proceeds downward; a possibility which has a most important bearing on the treatment, as will be seen later on. The infection of other parts of the digestive system, such as the liver, and consequently the production of sclerosis of that organ, does not concern us as rectal surgeons, although there have been suggestions of the possibility of a connection between bilharzial infection of the liver and hepatic abscess. But until now the connection has never presented itself formally to me, and I think for the present we may allow the question to stand over.

Symptoms.—The symptoms are similar to those of other forms of ulceration of the rectum and sigmoid, namely, pain in the back and lower limbs, tenesmus, frequent stools, the passage of mucus, blood, and pus, which contain quantities of bilharzia eggs.

CARCINOMA AND BILHARZIA.—Besides the fibrous growth occurring in bad bilharzia cases, true carcinoma is also sometimes found grafted on the existing disease, probably beginning in an irritative overgrowth of the glandular elements of the mucous membrane. This coexistence of carcinoma and bilharzia is generally regarded as fairly common, but I do not think it does in reality occur so frequently as some writers would lead one to expect. The formation of what may be termed bilharzial tissue has probably been mistaken for cancer.

Treatment.—The treatment of bilharzia of the rectum in its early stages consists in allaying the irritation of the parts and lessening as far as possible the hyperæmia and secretion of mucus. Similar means are used for this purpose as in other forms of ulceration of the bowel, and with much less hope of permanent results, inasmuch as the exciting cause comes from within and is protected by the layer of tissue over them, so that it is impossible to obtain satisfactory results from antiseptics or germicides without doing permanent injury to the overlying tissues.

While Dr. Milton mentions a number of palliative measures, he closes the subject of treatment with the following sentence: " The disease will never be capable of true cure until we find some method of attacking the parent worms in their at present inaccessible habitation."

ACTINOMYCOSIS.—This is exceedingly rare in the region of the rectum. It may either have its primary seat in the rectum or in the perirectal tissues. It begins with the formation of nodular granulomatous deposits in the mucous and submucous coats of the rectum; these contain the specific fungi, which break down and ulcerate. The ulceration may extend until it causes perforation of the rectum. The pathog-

nomonic signs are the yellowish granules in the pus when present and the presence of the ray-fungus.

GANGRENE OF THE RECTUM.—The more aggravated forms of any of these ulcerations under certain conditions are liable to be followed by gangrene; a condition rare in this locality, on account of its unusual blood-supply.

Thrombotic gangrene is probably the most frequent form in which it occurs here, on account of the great liability of these vessels to become thrombosed, although the diabetic form may be expected here as elsewhere in cases of diabetes. It almost always proves fatal, and is the most infectious of all diseases of the rectum.

M. Guibé in a very exhaustive paper published in *The Revue de Chirurgie,* 1908, reports in full a very interesting case of apparent " Spontaneous Gangrene of the Rectum." He reports also five cases of gangrene of which complete records were kept, and four cases in which the records were not kept. According to this authority gangrene is found almost exclusively in women.

The pain attending gangrene is very intense, the discharge is excessive and very offensive and is rapidly followed by general sepsis; collapse and death is sure to follow in a very short time, in spite of all treatment. It resembles somewhat tubercular ulceration in the early stages. No specific organism has yet been discovered as the etiological factor, but it rather seems to result from ordinary pus organisms, plus a lowered vitality, due principally to a defective blood-supply.

CHAPTER VI

PERIANAL AND PERIRECTAL ABSCESSES

THE tissues around the anal margin and in the rectum are subject to frequent abrasions, especially from hardened fecal masses, which are constantly exposed to infection from contact with the fæces. The parts having an abundant blood-supply with numerous lymph-vessels are peculiarly susceptible to inflammatory and suppurative processes. The character of the wound has little if anything to do with the extent of the infection. All that is necessary is a break in the skin or mucous surface; the extent of the infection depends upon the character and virulence of the organism, and the resistance of the tissues. The excessive strain to which the blood-vessels of these parts are subjected by reason of the peculiar anatomic perforation of the muscular coat of the rectum by the superior hemorrhoidal arteries, makes these veins especially susceptible to the rupture of their inner coat and consequent formation of thrombi; these frequently are the foci of infection. Such infection may occur in any one of several ways: through small areas of pressure necrosis, through sebaceous glands, or hair-follicles. A certain number of other cases of infection of the deeper perirectal tissues can be explained by abrasions or perforations of the rectal wall by sharp-pointed foreign substances in the fæces, which have either been taken in with the food or introduced into the rectum. There are also a large number of perirectal and pelvirectal abscesses in which the method of infection cannot be traced. Although infection travels along the course of lymphatic vessels as a rule, it can and does travel also along blood-vessels, hence with two such easy means of access to the deeper tissues it is not surprising that slight superficial abrasions on the skin or mucous membrane of these parts should be so frequently followed by infection and subsequent abscesses.

Frequently it is not by any means possible to connect the primary source of infection (which may have healed in a few hours) with the abscess formation, which may not appear for several days. Let it be constantly borne in mind that these abscesses are not always primarily due to infection by the ordinary pus organisms, frequently originating for instance in an infection by tubercle bacilli, which, after advancing to the stage of caseation, may become infected with pus organisms secondarily and result in the formation of an abscess. Abscesses in these localities may also result from infection by the ordinary colon bacillus, whose normal habitat is the alimentary canal.

The inflammatory processes which result in the formation of these abscesses may be either circumscribed or diffuse. Resulting in the formation of an enormous slough, it is said to be gangrenous. Then we have an erysipelatous form, which is very diffuse and spreads rapidly. Here is a very simple classification based principally upon the tissues involved:

SUPERFICIAL....... { Follicular
Subtegumentary
Ischiorectal

DEEP............. { Retrorectal
Superior pelvirectal
Interstitial

Now recalling the anatomic divisions of the cellular spaces around the rectum, their separate blood and lymphatic supply, it is obvious why such distinction should be made in the circumscribed inflammations in these respective localities.

Follicular Abscesses.—These, due to direct infection by pathogenic organisms of the follicles or sebaceous glands of the skin around the anal margin, may develop as furuncles, some reaching a considerable size, attended with inflammation, swelling, pain, and suppuration; sometimes assuming a graver type, involving subcutaneous and muscular tissues. As they do not generally involve the anal margin they are not likely to interfere with defecation, but are painful upon sitting or walk-

ing. Adjoining follicles are likely to become infected from the primary sore, giving rise to successive crops of these little furuncles.

Treatment.—In opening the abscess, care should be taken not to extend the incision through the indurated base, which is Nature's provision for limiting infection. Let the incision be limited to the size of the abscess cavity, and after thorough evacuation of pus swab out with pure carbolic acid. To prevent recurrence of these little abscesses frequently bathe the wound and the surrounding parts with antiseptic solutions and dust the wound with calomel and boracic acid in equal parts.

Subtegumentary Abscesses.—These always result from infection received through an abrasion of the skin or mucous membrane. Infection is taken by the lymphatics to the deeper tissues, where it is arrested either in a gland or by a thrombus in a lymphatic trunk, which then becomes the focus of infection and the seat of the abscess. Frequently such abscesses follow the infection of a thrombotic hemorrhoid.

Symptoms.—The first symptom that is likely to attract the patient's attention is pain, at first dull and throbbing in character; its severity seeming to depend in a measure on the proximity of the inflammatory process to the sphincter muscle and the anal canal, where the tissues are more closely attached and there is greater resistance. This is soon followed by swelling, varying in amount with the extent of the inflammatory process and the amount of tissue covering it. Many of these abscesses have ruptured before the patient seeks the advice of a physician, and in such cases the opening is nearly always internal, generally in the anal canal, this being the direction of least resistance. It is surprising to what extent burrowing has taken place even in those cases where only a few days have elapsed since the abscess formation, nor will rupture of abscess cavities stay this burrowing if the vent does not drain the cavity freely; hence the necessity for enlarging such an opening, or substituting another in a more dependent position,

as soon as the case is seen. If the abscess develops around the upper portion of the anal canal, there will be little evidence of the swelling externally, and it will best be appreciated by the introduction of the finger in the anal canal while pressure is made against the buttocks with the thumb of the same hand; in these cases the pain is likely to be very acute. Spontaneous opening most frequently occurs in the anal canal, and forms the typical case of blind internal fistulæ; the opening in these cases is usually higher than the bottom of the abscess cavity, which is therefore only imperfectly drained, and the retained pus soon burrows and points on the buttocks or perinæum.

Fig. 45.—Showing the location of superficial and deep abscesses around the anus and rectum. A, intramural, or submucous abscess; B, retrorectal abscess; C, ischiorectal abscess.

If large, these abscesses are likely to be attended with some constitutional symptoms, such as rise of temperature, etc.

These abscesses generally result in formation of fistulæ, with contraction, but not in an obliteration of the abscess cavity, and refuse obstinately to heal without surgical interference. No satisfactory explanation has ever been given; the most rational one is that generally if not always there is an internal opening into the rectum, through which the tract is constantly reinfected, preventing its healing. In a certain number of cases the abscess may form above the internal sphincter in the submucous tissue of the rectal wall, forming an intramural abscess (Fig. 45, A) recognized by its boggy feel,

and distinguished from an inflamed internal hemorrhoid by being beneath the surface and not projecting as much into the lumen of the bowel.

Treatment.—Whenever a subtegumentary or a submucous abscess is met with in the region of anus, anal canal, or rectum, it should be opened immediately and freely, whether the usual indications of pus exist or not. If pus has not formed, an incision relieves congestion, lessens tension and directs the pus, when it does form, to the surface. For a swelling due to extravasated blood, incision is still demanded in order to turn out the blood clot. If pus has already formed, prompt evacuation is the only safeguard against its burrowing; and if done before connection has been made with the interior of the rectum, it may prevent the formation of a fistula. In the case of an intramural abscess, open freely from the mucous surface of the rectum, swab out the abscess cavity with pure carbolic acid, let the sphincter be stretched, and frequent irrigations of antiseptic solutions used. In opening a subtegumentary abscess make the skin incision in the line of the radial folds; it should be free, and extend to the limits of the abscess cavity. If the abscess be opened soon after formation, it will not require curetting, but all pus should be pressed out of the cavity, which should then be swabbed with dry cotton and afterwards with pure carbolic acid. Subsequent treatment consists in thorough drainage, irrigations with antiseptic solutions, and cleanliness.

Ischiorectal Abscesses.—These occur in the ischiorectal fossæ and are a typical form of what is known as perirectal abscesses (45, C). Outside the muscular and aponeurotic layers of the rectum, and beneath the skin and superficial fascia, they may be limited to one side of the rectum, or occur on both sides simultaneously, or successively, and are connected posteriorly through the little space existing between the aponeurosis of the levator ani and the external sphincter muscle. When opened they do not exhibit a single large abscess cavity, but numerous foci of pus. This honeycombed condition is due to

the connective-tissue network which divides the cellular tissue into spaces, and in operating, unless great care is exercised to open up all these, the pus contained in them will burrow and infect other regions. Where these abscesses exist in both fossæ, and communicate with each other posteriorly through the foramen already mentioned, there will be found generally an opening from the communicating sinus posteriorly into the rectum at the posterior commissure; this opening into the rectum has frequently been the primary source of infection for both fossæ. Pus from an ischiorectal abscess may burrow through the levator ani muscle and infect the retrorectal space (Fig. 45, B), but is not likely to extend from the ischiorectal fossæ to the pelvirectal space, as the pus would have to burrow against gravity, a rare thing, unless tension is very great. The reverse condition, however,—infection of the ischiorectal fossa by pus from the pelvirectal space,—is very likely to occur, for frequently the subcutaneous tissue around the anus and the submucous cellular tissue around the anal canal become infected from the pus from a pelvirectal abscess.

The importance of these suggestions and possibilities show the necessity for the early evacuation of pus, to prevent its extension to these different spaces and thus becoming more serious.

Symptoms.—There is redness, swelling, and pain, and, as these abscesses are generally large, the formation of pus is likely to be attended with constitutional symptoms, such as distinct rigor, rise of temperature, accelerated pulse, and headache. The induration can generally be felt before the swelling and redness are apparent to the eye. The inflammatory process may be very extensive and involve the perinæum, anus, rectum, scrotum, and both buttocks, but such an extensive involvement is only likely to follow delay in opening the abscess cavity, imperfect drainage, or very virulent forms of infection. If there has been much delay, the pus is likely to be very fetid and of a disgusting odor, not due, as often supposed, to any direct connection of the abscess with the rectum, but most

likely to the character of one of the pus-forming organisms common in this locality. The same may be said of the gas which sometimes escapes with the pus.

All the physical conditions and local symptoms of an ischiorectal abscess may result from a hemorrhage into the spaces, without the extravasated blood becoming infected. This may be suspected if these local conditions appear without the constitutional symptoms of inflammation, or it may be a subacute tubercular process.

Treatment.—A free incision should always be made at the earliest possible moment, even at the risk of anticipating the formation of pus. This may be done under the influence of local anæsthesia by ½ of 1 per cent. solution of cocain, if the abscess is sufficiently deep to allow the injection to be made in the healthy tissues above it. Let the incision be wider than the abscess cavity, so as to furnish free drainage, and well outside the sphincter muscle; the finger is now introduced into the cavity, the trabeculæ of necrotic tissue broken down and the necrotic surfaces scraped lightly with a dull curette, then swabbed with a solution of pure carbolic acid, and if there is much oozing of blood it may be packed with gauze for the first twenty-four hours. Subsequent treatment consists in keeping the wound well drained, if necessary with rubber tubing or strips of gauze; frequent irrigations with antiseptic solutions, and applications of a 5 per cent. solution of nitrate of silver to the raw surface every alternate day. Where the abscess involves both ischiorectal fossæ, the incision should be very free on one side and extend up to and include the posterior commissure; the incision into the other fossa need only be sufficiently large to drain it thoroughly. If no opening into the rectum can be found, it will be better to stretch the sphincter muscle, as this relieves the muscular spasm, allows gas and fæces to come away freely, and thus relieves the thin rectal wall of any undue pressure. For the same reason it is better to leave in the rectum a piece of stout rubber tubing after stretching the sphincter.

The distinction between superficial and deep abscesses is that the former occur in the tissues below the levator ani muscle and the latter above it. There are three spaces that exist above the levator ani muscle around the rectum. The two lateral ones have been designated by Richet " the superior pelvirectal spaces "; as previously described in the anatomy of the rectum, the posterior is " the retrorectal space." The latter occupies all the region between the rectum and the anterior surfaces of the sacrum and the coccyx.

The blood-vessels which ramify in the retrorectal space come from the middle and lateral sacral arteries, with a few branches from the inferior mesenteric. Those in the superior pelvirectal space come from the hypogastric artery and are connected with the general circulation. The lymphatics of the two spaces are also comparatively distinct. With such distinct anatomic divisions, vascular supply, and lymphatic distribution, it is readily understood why a distinction is made between the circumscribed inflammations in these two areas.

Retrorectal Abscess.—This develops from an infection in the cellular tissue of the retrorectal space, frequently following the operation of posterior proctotomy for stricture of the rectum, especially where there has been imperfect drainage (Fig. 45b). This space may also be infected by the fistulous tracts which often form in connection with strictures; from the breaking down of gumma, or tuberculous glands; from extension from ischiorectal abscesses, or varicose ulceration; and often follow resection of the rectum.

Symptoms.—Apart from the usual symptoms attending the formation of deep-seated abscesses around the rectum, such as a dull heavy pain in the sacrum, with a sense of weight in the pelvis, and shooting pains down the course of the sciatic nerve, the special symptoms are rather obscure in the early stages. There is likely to be an increase of pain attending defecation, and some rise of temperature.

Upon introducing the finger into the rectum a boggy mass can generally be felt posteriorly in the hollow of the sacrum. If not punctured early, the abscess will either rupture spontaneously into the rectum, or perforate the levator ani muscle, infect the ischiorectal fossa, and finally open on the skin of the buttocks. When the latter does occur, or whenever the abscess invades any of the superficial tissues around the anus it will likely be attended with constitutional symptoms and very severe pain. These abscesses may also burrow outward through the ischiatic notch and open on the buttocks.

Treatment.—A free and deep incision in the shape of a quadrant should be made in the skin between the anus and coccyx. After the abscess cavity has been evacuated it should be gently scraped with a dull curette and irrigated with a solution of bichloride of mercury 1 to 1000. A rubber drainage-tube may then be introduced and held in position for several days to promote thorough drainage and the sphincter moderately dilated to allay spasm. Subsequent treatment consists in irrigating the cavity twice a day with an antiseptic solution occasionally stimulating the granulations with from 5 to 10 per cent. solutions of nitrate of silver, and allowing the patient to walk about the day following the operation, to facilitate drainage.

Superior Pelvirectal Abscess.—The infection giving rise to these abscesses seldom comes from the rectum, but from adjoining organs and canals, as from posterior urethritis, a prostatitis, seminal vesiculitis, or from any of the infectious diseases peculiar to the generative organs. When it occurs in women it is spoken of as a pelvic abscess. The superior pelvirectal spaces may also become infected from a psoas abscess, an appendicitis, necrosis of the bones of the pelvis, or from an infection of the anterior rectal wall, the infection being carried by the middle lymphatics and arrested in the lower part of these spaces by the sudden bending of the lymphatic vessels.

Symptoms.—The primary symptoms are generally referred to the organ or canal in which they arise. The condition is

frequently ushered in by a chill, fever, uneasiness, and pain, usually situated in the neck of the bladder, and there is almost invariably frequent and painful micturition. There may be complete obstruction of the urine from pressure on the ureters, œdema of the scrotum, or vulva, with pains in the perinæum. In the latter stages, when the accumulation of pus is considerable, there is likely to be difficulty and pain attending defecation.

There is a tendency for the pus to burrow upward into the iliac fossa in these cases, rather than toward the perinæum where there is great resistance; hence there is considerable danger from the probability of the abscess rupturing into the peritoneal cavity, especially if its evacuation by surgical methods is delayed. The pus from these abscesses may also perforate the bladder, urethra, or rectum, but very rarely the vagina; they may also break through the levator ani muscle and invade the retrorectal or ischiorectal spaces.

Diagnosis.—The history of the case is very important in making the diagnosis, as might be inferred from what has been said about the infection originating in adjoining organs. A digital examination of the rectum and vagina will give the most valuable information in making the diagnosis; it will elicit tenderness, swelling, pain above the prostate in males, and to one or both sides of the central line, extending around the rectum. In women it is higher up, and more to the side. In thin people the swelling may be more clearly outlined by bimanual palpation, introducing one finger into the rectum or vagina and the other hand pressing upon the lower part of the abdomen.

Treatment.—This consists in the free evacuation of the pus at the earliest possible moment, by a free and wide incision, made to the side of the rectum in which the swelling is felt, about the posterior part of the anterior quadrant, parallel to the fibres of the external sphincter muscle, and at right angles to and through the fibres of the levator ani muscles. The

deeper part of the incision should be made by careful dissection in order to avoid injuring important organs. The sphincter muscle should be stretched. After the abscess cavity has been thoroughly evacuated, a long drainage-tube should be introduced, after which irrigations with antiseptic solutions should be begun.

Curetting of these cavities is advisable only in the hands of the most experienced. Packing, if done at all, should only be to control excessive oozing and the material not be allowed to remain in longer than twenty-four hours. If in the course of a few days the wound should seem sluggish and the discharge remain fetid, the cavity may be swabbed out with a 95 per cent. solution of pure carbolic acid. In women, the abscesses are likely to become chronic, and coexist with chronic cellulitis.

The pelvirectal, retrorectal and the ischiorectal spaces are subject to a very virulent form of septic infection from perforation of the rectal wall in defective drainage. This is sometimes spoken of as a diffuse septic periproctitis, but the extent of the infection is only measured by the depth of the perforation, the resistance of the tissues, or the virulence of the organisms. The symptoms from such an infection are exactly similar to those previously described when either of these spaces is infected by ordinary pus organisms, except that in the former they are very much aggravated by the increased virulence of the organism and are much more likely to prove fatal, unless promptly checked.

Idiopathic Gangrenous Periproctitis.—Under this title Furneaux Jordan (*British Medical Journal,* January 18, 1879, page 73) has described a very unusual type of perirectal inflammation. "It consists in a slowly extending cellulitis, which is not attended with much swelling, or pain. It develops usually without any previous injury, although it may follow surgical operations about the rectum. It resembles very much the condition produced by urinary infiltration of the perinæum. It occurs generally in high livers and drinkers, and so far all

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the cases reported have been in males. Although quite a number of surgeons have reported individual cases of this disease, yet it is rather rare.

"ETIOLOGY.—There is nothing definite known of its etiology, or pathology, no satisfactory study of its bacteriological factors having been made, so far as we are aware.

"*Symptoms.*—The disease comes on with a chill, followed by high temperature, and great mental and physical depression. There is some pain about the anus, the skin is red and brawny, the epithelium elevated and covered with small vesicles; these soon break down and leave black gangrenous patches, which discharge an ichorous fluid instead of pus. The disease extends very rapidly, and tends to recur and invade other tissues after it has apparently been checked. It invades all the deep spaces, and tends to progress upward toward the peritoneum, or, after invading the retrorectal space, it may pass out through the obturator foramen, and invade the subtegumentary tissues on the buttocks. Whenever the peritoneum becomes involved, death ensues very rapidly. Even if the patient does not succumb to sepsis and exhaustion during the early stages of the disease, it will require the greatest amount of skill and good management to tide him over the more exhausting stages of sloughing and to increase the danger, probably hemorrhage.

"*Treatment.*—Make free and repeated incisions through all gangrenous tissues, wherever they appear to be followed by frequent antiseptic irrigations and hot antiseptic poultices. If these incisions are followed by excessive hemorrhage, as likely, it is best controlled by pressure, the vessels being very friable in this condition. General stimulation, with the most nutritious and concentrated food is necessary."

Interstitial Abscesses.—These occur in the muscular and cellular tissues of the buttocks, and are more or less remote from the rectum, the infection being carried from the perirectal tissues along the course of the lymphatics. The symptoms and treatment are similar to those in the varieties previously described, except that the pus is not so deep seated.

CHAPTER VII

FISSURE IN ANO, OR PAINFUL ULCER

AN anal fissure is a rather superficial elongated rent or crack, situated in the mucocutaneous tissues (Fig. 46), and characterized by acute pain and paroxysmal contraction of the sphincter muscle. The term fissure is generally but improperly applied to all forms of ulceration that are within the grasp of the sphincter muscle, many of which are wanting in the true characteristics of fissure in ano, namely, the peculiar pain and paroxysmal contraction of the sphincter. While these ulcers generally present the appearance of an elongated slit in the contracted state of the anal canal, if the latter is dilated the ulcer will frequently present an oval or circular appearance; it is when they are so presented more or less irregularly in the contracted state of the anal canal that they are denominated ulcers. Ulcerations of the rectum which occur in the mucous or submucous tissues above the sphincter muscle, even though they encroach upon the upper limits of the said muscle, should not be classed as painful ulcer or fissure.

PATHOLOGY.—I do not think it worth while to speak of the slight pathological changes found in the acute and superficial cases of fissure in ano which are wanting in the essential characteristics, and are merely characterized as such from their location and appearance. The characteristic features of fissure in ano are dependent upon pathological changes found in more chronic forms of this ulceration and now to be described. The edges of the ulcer are elevated, irregular, and thickened, and the tissues at the base of the ulcer infiltrated with fibrous tissue, which renders them hard and inelastic. According to the microscopic examinations of M. Hartman (*Op. cit.,* page 422), in the deep muscular layer the nerve-trunks are surrounded by fibrous material and show interstitial and intra-

fascicular neuritis. The sphincter muscle itself is hypertrophied and very resisting. These characteristics may be found in any form of ulcer in this locality, and, on account of the symptoms which attend such pathological changes, would constitute a fissure in ano or painful ulcer, no matter what specific character might constitute its etiological factor.
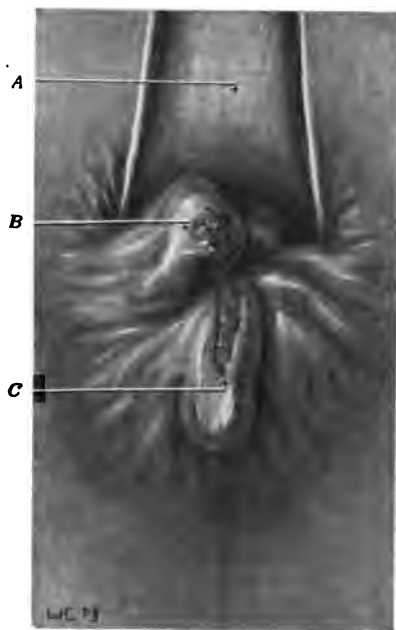
FIG. 46.—Fissure in ano. A, Earle's rectal speculum introduced; B, ulcerated hemorrhoid; C, fissure.

ETIOLOGY.—While the chief primary cause of fissure is constipation, due to tearing of the surfaces by hard fecal masses, yet it is only by frequent repetition of this accident in normal tissues that the requisite pathological conditions causing the train of symptoms found in fissure in ano are produced. I am strongly of opinion that fissure in ano is most frequently preceded by the necessary pathological conditions

induced by an inflamed tag, or some other subacute inflammation of these parts, resulting in fibrous infiltration rendering it inelastic and unyielding, hence the frequent association of fissure with such a condition.

Fissure in ano may also be produced by : foreign bodies, as spicula of bone or irritating substances in the fæces, producing an abrasion and consequent ulcer; congenital narrowing of the anus; foreign bodies introduced into the rectum; polyps which overhang and protrude into the anal canal at stool; the different forms of specific ulceration, as syphilitic, tubercular, or malignant; atrophic proctitis; diseases of the skin involving the anal margin; occasionally from an operation on the anal outlet where healing has been delayed by neglect or improper treatment; pederasty; tearing of the *semilunar valves* by the projection of some foreign substance in the fæces (Ball) ; and hemorrhoids are a very frequent cause.

Spontaneous healing of these painful ulcers rarely if ever occurs, because of the pathological conditions already alluded to.

Symptoms.—The most characteristic symptom is the peculiar pain and the length of time it continues after an evacuation of the bowel or from any distention of the sphincter muscle. As a rule the patient feels perfectly comfortable until he has a stool, nor in most cases does the pain immediately follow the stool, but comes on from fifteen to twenty minutes afterward. At first it is only a dull aching soon increasing in severity until it becomes almost unbearable; this degree of severity is maintained for several hours, then gradually subsides, the patient getting fairly comfortable late in the day; in other cases it may only last a few hours, to recur again at the next stool, after each of which, however, it is likely to grow more severe and be more protracted.

There is frequently a small amount of blood lost at each stool, from a fresh tear in the old ulcer. The constipation which probably preceded the fissure is likely to be increased

by the pain and spasm of the sphincter muscle which attends each evacuation of the bowel. Quite a clear relationship exists between the character and severity of the pain, the chronicity of the fissure or ulcer and the extent of fibrous infiltration. The nearer the location of the ulcer to the anal margin, the more acute and severe the pain.

Reflex Symptoms.—The most usual reflex symptoms associated with fissure in ano are painful micturition, pains in the back, neuralgic pains running down the legs, and sometimes occipital and facial neuralgia.

Diagnosis.—While the peculiar character of the pain in the majority of cases of fissure in ano as heretofore described may indicate fairly well the character of the trouble, yet the only positive way of making a correct diagnosis is by careful inspection. When making such, the physician should be very careful not to cause any more pain than is necessary, remembering the exquisitely sensitive condition of the parts. The examination can generally be made sufficiently satisfactory without the aid of the speculum, or, when that is necessary, it will be sufficient to introduce it for a very short distance only. With the buttocks well separated and the patient directed to bear down, the fissure can generally be seen, especially if the usual tag of skin is present at the lower margin to direct the examiner. If this should fail, then an Earle rectal or a Sims vaginal (virgin size) speculum may be partially introduced into the anal canal, pressing the instrument against the opposite wall and pulling it away from the fissure. If this is done carefully and gently, just sufficiently to get a glimpse of the lower portion of the fissure, it will suffice to make a diagnosis of fissure, which is all that is necessary to warrant the use of a general anæsthetic for an operation, when a more careful examination of the rectum for additional trouble can be made. The best position for a patient to assume for this examination is the left lateral or Sims's. In women when the fissure is on the anterior anal wall a satisfactory view of it may be obtained by introducing the index finger in the vagina and turning the

anterior wall of the rectum out. If the fissure is very sensitive the pain may be allayed by the insufflation of powdered anesthesine, which will have the desired anæsthetic effect in a few minutes, as seen by the gradual relaxation of the sphincter and complete exposure of the fissure.

Treatment.—Little need be said of the palliative treatment of chronic cases of fissure in ano, because even should it succeed in causing the fissure to heal, the scar tissue which exists at the base of the wound will tear again the first time the patient has a constipated stool. In acute cases, and in those who refuse to be operated upon, much comfort can be given by carrying out the following directions: Keep the fecal evacuations soft, restrict the patient to one stool in twenty-four hours, make him lie down for half an hour after the stool, and during that time, or as long as the pain continues, have him apply hot-water bags to the perinæum. To regulate the bowels give moderate doses of the fl. ext. cascara sagrada, or of the fl. ext. senna, which may be assisted by enemas of cotton-seed oil, or warm water. If hemorrhoids coexist, an enema of cold water is better to relieve the congested hemorrhoids. The diet should consist largely of fruit and vegetables in order to encourage soft and mushy stools. To allay irritability of the sphincter, powdered anesthesine may be applied directly to the fissure. After letting it remain a few minutes in order to get its local anæsthetic effect, a pledget of cotton is soaked in pure ichthyol and applied to the fissure, which is exposed by the aid of an Earle speculum holding back the opposite wall. These applications should be made daily. In acute cases these directions may relieve permanently.

OPERATIVE TREATMENT.—The procedure for the treatment of fissure in ano includes forcible dilatation, incision, and excision. Probably the largest number of cases at the present day, if we except those by specialists in proctology, are treated by dilatation. As they are likely to keep in touch with their cases, and as recurrences from the hands of others are more prone to come under their care, they have been

better able to judge of the frequent failures of this method, the cause of which is, that in forcible dilatation a rent is made through the bottom of the ulcer, which, while it gives immediate relief from the most distressing symptoms by putting the muscle at rest, leaves *in situ* the scar tissue, which tears again whenever the patient becomes constipated, and the whole train of distressing symptoms return. Such a failure is especially likely to take place where there is a polypus at the upper angle of the fissure, unless the polypus is first removed, and the same may be said of the inflamed tag of skin that is sometimes met with at the lower angle of the fissure. We would therefore advise that excision should supplant forcible dilatation in all cases of chronic fissure in ano. For its application in acute cases, and for the benefit of those who still wish to practise forcible dilatation here is the technic:

It may be done either by introducing both thumbs into the rectum, using the tuberosities of the ischium or pubis and sacrum as a fulcrum to be clasped by the fingers toward which the sphincter is pulled; or by introducing all four fingers in succession, then lapping them in such a manner as to form a cone; or by a mechanical dilator, probably the best and safest of which is a conical metallic dilator devised by Howard A. Kelly. Whichever method is used, care should be taken to proceed slowly and gently until the muscle is felt to yield under the pressure. Even with the greatest care and gentleness the floor of the fissure or ulcer is almost invariably torn through, and the good results in relieving pain are probably due more to this fact than to relaxation of the muscle brought about by stretching it. This is made more probable by the rapid return of the tone of the sphincter muscle after such forcible dilatation. Within an hour after the divulsion there is no gaping of the anal orifice, and the muscle will respond in a measure to stimulation. At the end of seventy-two hours sphincteric control will be almost complete. The dilatation is generally attended with some hemorrhage, but this is never alarming.

If paralysis of the sphincter muscle facilitates the healing of the fissure, and in view of what has just been said about the early return of muscular contraction following dilatation, it would doubtless be better to introduce the Lynch tube and let it remain for forty-eight hours. Those who have tried this think well of it, and assert the patient to be much more comfortable with the tube in. Permanent incontinence of fæces has been known to follow forcible dilatation of the anus. Of this result James P. Tuttle has reported two cases.

Incision.—The second method for operating consists in incising the fissure or ulcer through its base. This was first advocated by Boyer in 1788, he claiming the fissure to be due to spasm of the sphincter and advising its complete division to control the spasmodic contraction; he did not advocate cutting the muscle through the base of the ulcer in all cases, but sometimes divided it on either side of the rectum. He also introduced a plug to keep up continuous dilatation. Subsequently others held that it was only necessary to divide the superficial muscular fibres directly beneath the ulcer. At present both depth and location of incision are considered of greatest importance; let it be deep enough to put the muscle at rest and made through the floor of the ulcer to avoid the risk of secondary infection. These directions do not apply to ulcers directly over the anterior or posterior commissure. On account of their decussations at the former, and of their tendinous prolongation to unite with the coccyx at the latter, at either of these points the V-shaped incision is best. This puts the muscle on both sides of the fissure at rest. Make the incision a little longer than the fissure—quarter of an inch deeper than at its greatest depth—and squarely across the muscle fibres. Where no complications exist, the incision may be made under local anæsthesia by a hypodermic injection of ½ of 1 per cent. solution of cocain; the injection being made directly beneath the floor and to the sides of the ulcer, taking care to use plenty, as there is little danger from such a weak solution. After making the injection and waiting for

several minutes for its anæsthetic effect, introduce a single-bladed speculum against the opposite wall of the anal canal, which will bring the fissure into full view, when the length and depth of the incision can be watched. If there is a polypus or hemorrhoid at the upper angle, or a sentinel tag at the lower one, it should be excised; the indurated edges of the ulcer also removed and granulations scraped off; then the incision packed lightly with sterile gauze and the patient confined to bed for twenty-four hours.

Excision of the Fissure.—Reference has been made to the necessity of excising the scar tissue in the treatment of fissure in ano, and any method that fails to thoroughly accomplish this end will fail to give permanent relief. This can be properly given only by excision, therefore in all chronic cases, or whenever the scar tissue can be recognized, I would suggest it. The resulting wound may either be closed by catgut sutures, or allowed to heal by granulation; I myself preferring the latter method, and if complications exist, they can be removed at the same time. My preference for allowing these wounds to heal by granulation is on account of the possibility of infection from the ulcer, and the extreme sensitiveness of the parts which always exists in connection with fissure; the closure of the wound by sutures is followed by a great deal of pain, which is likely to last as long as the tension of the sutures continues. If the wound is left to heal by granulation, it should be irrigated twice daily with a mild antiseptic solution.

THE COMPLICATIONS OF FISSURE.—The wound following an operation for fissure may become infected and give rise to infiltration of the tissues by pus, which may even form pockets. This condition must be met by securing better drainage, more frequent irrigations, and stronger antiseptic solutions. If the bowels are allowed to become constipated, especially if hard scybalous masses form before complete healing and tissues have regained normal elasticity, the wound is likely to be torn open. Special attention should, therefore, be paid to

keep the evacuations soft and regular. Should the fissure be tuberculous, then let the incision be made with the actual cautery knife. Incontinence of fæces may follow any of the operations for fissure; it generally results from an oblique incision of the sphincter muscle, which should always be avoided. When it follows forcible dilatation, it is generally due to too rapid or too great divulsion of the muscle, or to stretching it in very old or very feeble persons.

MALFORMATIONS OF ANUS AND RECTUM

By referring to the embryology of the fœtus it will be seen that the anus and rectum are developed from different layers of the blastoderm, and that the blood-supply of each is derived from different sources; therefore they do not necessarily develop completely or simultaneously, and when they do not, malformations result. Such malformations of either anus or rectum are likely to be associated with malformations of other parts of the body derived from the corresponding layer of the blastoderm.

The classification of these malformations is based upon the above-mentioned differences in origin. I class them under: malformations of anus and malformations of rectum.

MALFORMATIONS OF ANUS.—(*a*) Entire absence of anus (Fig. 47); (*b*) Abnormal narrowing; (*c*) Partial occlusion: (*d*) Absolute occlusion; (*e*) Anal opening at some abnormal point on the perinæum, scrotum, or sacrum (Figs. 48, 49).

MALFORMATIONS OF THE RECTUM.—(*a*) Rectum entirely absent (Fig. 50); (*b*) Arrested in its descent at a point more or less removed from the anus, the latter being normal (Fig. 51); (*c*) Opening into some other viscus, with anus either absent or present in its normal position (Fig. 52); (*d*) Normal rectum and anus, but either ureter, bladder, vagina, urethra, or uterus opening into them (Figs. 53, 54, 55, 56, 57, 58).

Treatment.—This depends entirely upon the completeness of the atresia. When complete, relief must be sought at once by surgical means in order to provide an exit for the fæces. On the other hand, where atresia is only partial and a sufficient exit for the meconium and fluid fæces exists, it is better to postpone operative measures until the child is stronger and better able to stand an operation. In these cases, while waiting

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for a more propitious time to operate, the opening already existing may be still further dilated and thus be made to give freer exit to fæces.

The chief object to be sought in all operative procedures for the correction of these malformations should be the restoration of the parts to their normal functional activities as nearly as possible.

FIG. 47.—Entire absence of anus.

William M. Mastin, of Mobile, Alabama, has given the following résumé of the surgical treatment of anorectal imperforation in the new-born.

I have taken the liberty of quoting verbatim from his article:

" By the ancients this deformity was scarcely considered as amenable to the surgeon's skill if we interpret aright the

teachings of the Arabic and early Greek and Roman physicians. The first authentic mention of such surgical intervention of which we possess any knowledge is the classical case recorded by Paulus Ægineta, in about the seventh century, who successfully operated upon an atresic anus in a new-born infant by perineal incision and dilatation. This operation,

Fig. 48.—Anal opening at some abnormal point on the perinæum, scrotum or sacrum.

however, was little more than a blind plunge of the knife into the rectal pouch; but, nevertheless, the method grew in popularity, and as performed either with the bistoury or the trocar, or a combination of incision and puncture, followed by prolonged mechanical dilatation, was the procedure in vogue for hundreds of years. Hence we find the noted German surgeon, Laurence Heister, in 1768, and Benjamin Bell, of England, in 1787, advocating the method with but slight modifications,

and yet again having the sanction of Copeland Hutchinson in 1822.   In France the operation received renewed impetus through the publication of a number of successful cases by Breschat in 1834, which was further accentuated by the report of Roux de Brignolles the next year.   The latter operator improved the operation somewhat by advising that the fibres of the anal sphincter be carefully preserved during the perineal

Fig. 49.—The rectum ends in a blind cul-de-sac posteriorly to the anus; the anus opening into the vagina.

dissection.   Then came Berard, in 1844, Vidal de Cassis, Guillon, Malgaigne, and Velpeau in the same country, together with Dieffienbach, who also advised resorting to colotomy if the perineal incision failed to open the rectal cul-de-sac.   About the same period (1800) Dr. John P. Campbell, of Flemings- burg, Kentucky, was the first surgeon in our own country to put the operation into successful practice.

" The technic thus performed varied only in the depth, length, and direction of the perineal incision; and the first really important surgical advance was made by Amussat in 1835, when he recommended and employed a rational perineal operation or true proctoplasty. This surgeon formulated the rule that a careful dissection of the perinæum, extensive if necessary, be made to expose the rectal ampulla, which

Fig. 50.—Rectum entirely absent.

should be freely detached from the surrounding tissues, and, after evacuation of its contents, drawn down to the perineal incision, and the mucosa accurately sutured to the skin margin without undue tension. The all-important feature of Amussat's operation was the union of the mucous membrane of the enteron with the skin, by this means preventing the contraction of the opening which, in the previous methods,

always narrowed into a simple fecal fistula, necessitating constant dilatation to permit discharge of the contents of the bowel.   In those cases where the terminal end of the rectum can be easily reached through the perinæum, this method, with but trivial changes, is the one generally employed to-day.

" Amussat practised in his early operations a T-shaped cut, the central or upright limb of which extended from the

Fig. 51.—Rectum arrested in its descent at a point more or less removed from the anus, the latter being normal.

centre of the anal area posteriorly to the coccyx, the transverse bar passing across the perinæum from one tuberischium to the other.   The anatomical objections resulted in his rejecting this incision and adopting the simple straight section extending along the mid-line of the perinæum from the perineoscrotal juncture in the male, or the vulvular commissure in the female, to the coccyx.

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"Some years later (1844) Stromeyer suggested that, in those instances where a perineal dissection failed to disclose the enteron, the peritonæum be deliberately opened through the perineal wound, the cavity explored by the finger, and the existence and location of the rectum accurately determined. This was a step in advance of his time, but it was never put to practical use until 1872, when Lieserink for the first time
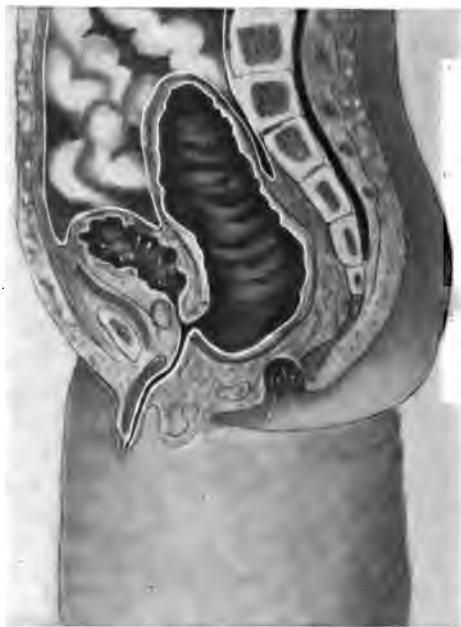

Fig. 52.—Rectum opening into some other viscus, with anus either absent or present in its normal position into urethra.

utilized the suggestion with a happy result. Since then, the operation has been performed by a number of operators."

In those forms of malformation in which there is complete occlusion, immediate and radical surgical interference is necessary and should be done under strictly antiseptic precautions, but without a general anæsthetic, as this is not well borne by children.

MEANS FOR LOCATING THE RECTUM.—The presence of the rectum is sometimes indicated by a greenish tinge in the skin of the perinæum, when the rectum lies directly beneath it; its near approach to the surface may also cause a bulging; palpation may also be used with good results, and even better results expected from percussion.

FIG. 53.—In which the rectum opens at the glans penis.

If these methods fail, then dissection may proceed on general principles without such aids in locating the rectum, but I would positively interdict, under any circumstances, a former recommendation of introducing a trocar or an exploring needle into the perinæum, either for diagnostic purposes or for immediate relief of the over-distended rectal pouch, a far too rash and inaccurate procedure in the light of present knowledge.

THE OPERATION.—Let a straight incision be made beginning at the normal position of the anterior margin of the anus and extending backward to the tip of the coccyx; this incision should also extend through the subcutaneous tissue. If there be a rudimentary anus the incision should begin at its posterior margin, when the external sphincter is exposed, or, in its absence, the fibrous band that replaces it should be pulled

FIG. 54.—In which the rectum opens into the vagina.

gently apart instead of being excised. Still failing to find the rectum, the dissection should be continued upward and backward in the hollow of the sacrum, in order to avoid wounding the pelvic organs. When found it should be loosened from its attachments, if any, and if possible brought out through the wound, before being opened. When, on account of the shortness of the mesorectum, or of great distention of the rectal

pouch, this cannot be done, a trocar may be introduced and the contents drawn off, which will generally allow the bowel to be drawn down to the margin of the skin wound. In either case, before opening the sac the wound should be well packed between its sides and the rectum with sterile gauze. After the bowel contents have been drawn off, enlarge the opening, draw down and stitch the mucous membrane to the skin margin of

FIG. 55.—In which the rectum opens into the bladder.

the wound, the serous and muscular coats being allowed to retract. This will protect the perineal wound from contact with the fecal discharges. If the rectal pouch cannot be drawn down sufficiently to attach its mucous membrane to the skin margin of the wound at the point where the anus should normally be, then it may be attached to the point nearest this, where it would reach without too much tension.

In order to give a broader raw surface for attaching the mucous membrane of the bowel, and to protect the wound more effectually from discharges, the recommendation of Vincent should be carried out, namely, cut away two elliptical flaps of skin, one from each side of the perineal wound. After the mucous membrane has been sewed to the skin margin, the posterior part of the perineal wound may be closed with deep

Fig. 56.—In which the rectum descends posteriorly to the anal canal.

silk or chromicized cat-gut sutures, care being taken to draw together the fibres of the external sphincter muscle.

The mucous membrane of the rectum should be stitched to the skin margin of the wound with sterilized cat-gut, in a continuous suture, for each side of the rectum only. If there is much tension pass also an anchor suture either through the external walls of the gut or the mesorectum, out through the skin on either side and tie over a wad of gauze.

When the rectum is arrested high up in the pelvis, bear in mind the difficulties to be encountered from the very small measurements of the outlet in the pelvis of an infant. To more fully appreciate how narrow this space, I give the measurements of the normal infantile pelvis. Between the tuberosities of the ischium, from ½ to 2 cm.; from scrotum

FIG. 57.—In which the peritoneal cul-de-sac extends between the rectum and anus.

to coccyx, from 4 to 4½ cm.; from posterior commissure of vagina to coccyx, from 3 to 4 cm. This only gives a maximum length of 4 cm., and a maximum breadth of 2 cm. The depth of pelvis from the tip of coccyx to promontory of the sacrum is only about 6 cm., and measurements may be still further reduced in these abnormal cases. In order to increase the space in the direction where there is most room, namely, the hollow of the sacrum, it is better to follow the recom-

mendation of Vincent to extend the incision up through the coccyx and lower portion of the sacrum, splitting them through the centre with scissors, as these bones have not become completely ossified. This leaves intact the normal attachment of the anal and rectal muscles and affords ample room and a good view when the wound is held open by retractors.

FIG. 58.—In which a fibrous cord connects the blind ends of the anus and rectum.

If, after splitting up the coccyx and the lower portion of the sacrum, the rectal pouch should be found so short that it will have to be attached at this end of the wound, let the cartilaginous sections of these bones be carefully dissected out before the rectal pouch is attached. otherwise the rectum will eventually be included in an osseous outlet. It would be better to introduce a sound in the male bladder, or in the vagina,

before beginning to search for the rectal pouch, to avoid wounding these organs. A careful watch should always be kept for the fibrous band which sometimes leads from the imperforated anus to the rectal pouch; when found, follow it up closely as a certain guide to the rectal pouch.

If not found in the hollow of the sacrum, continue the search forward and upward in the peritoneal cavity, where it may be found attached to the promontory of the sacrum, or to its sides, in which case it is likely to be entirely enveloped by the peritoneal fold by which it attaches itself to the bony framework of the pelvis. When this is the case, the rectal pouch must be enucleated before it can be brought down. A difficult procedure, and I deem it wiser when such a condition is recognized either to do an inguinal colotomy or to bring down a loop of the sigmoid and attach it to the perineal wound. In all cases where the peritoneal cavity has been opened, it must be closed, or packed with sterile gauze before the rectal pouch is opened. If impossible to bring the rectal pouch outside the peritoneal cavity, close the cavity and pack off the perineal wound in order that it may be utilized at a later date, if the rectal pouch should descend, as it sometimes does, and let an inguinal colostomy be done at once.

Treatment of the Anal Cul-de-sac.—In those cases in which the anal cul-de-sac is fully developed, but the rectum does not unite with it, but is more or less removed from it, as illustrated in Fig. 51 and described in subdivision *b*, under " Malformations of the Rectum," the end-to-end union between the anal cul-de-sac and the rectal pouch, which would naturally suggest itself as the best method for meeting such a condition, is very difficult to perform and uncertain in its results.

Experience has shown it to be better to dissect away the lining membrane of the cul-de-sac entirely, including the skin around the anal margin, also to bring the rectal pouch down to the margin of the skin, open it and suture its mucous membrane there. This can be done without much dissection if the rectal pouch is in close proximity to the anal cul-de-sac.

Colotomy in Cases of Imperforate Anus.—Some surgeons recommend colotomy as a preliminary proceeding to the perineal operation in all cases where the rectal pouch cannot be definitely located without deep dissection. This is claimed to be more certain and less serious than proctoplasty, and not to interfere with the subsequent establishment of the anus at its normal site when the child is older and better able to stand such a serious operation. The necessary abdominal wound for the colotomy, it is urged, can first be used for locating the rectal pouch, and if found within easy reach of the perinæum the abdominal wound can be closed and the perineal operation done immediately.

Remember, when a colostomy is to be done, that in infants the sigmoid flexure is frequently found on the right side.

Treatment of Abnormal Narrowing.—Where only a decided narrowing of the anal canal with a reasonable exit for fecal matter exists, dilatation with rectal bougies may be all that is necessary until the child is older and sufficiently strong to stand the necessary surgical operation.

Treatment of Partial Occlusion by a Band.—There can be no good reason for not removing this at once, after which the anus should be well dilated.

Treatment of Complete Occlusion by a Membranous Diaphragm.—This consists of a simple crucial incision of the membrane with subsequent dilatation, but it is well to examine for a possible second membrane higher up.

Treatment of Cases in which the Rectum Opens at Some Abnormal Position on the Surface of the Body.—As the opening is generally sufficient to afford relief during infancy and the discharges are mushy, operative procedure can be delayed until the child is better able to bear it.

If the abnormal opening is not too far removed from the site of the normal anus, the abnormal channel may be dissected out back to the rectal pouch, carried down to the site of the normal anus, and there attached. When too far removed to carry out this suggestion, let the rectal pouch be searched

for by dissection at the site of the normal anus, as previously recommended. When found, it may be separated from the abnormal channel, through which it relieves itself, the proximal end of which should be closed, and the rectal pouch brought down and attached at the normal site of the anus. The abnormal channel will be likely to close gradually if the necessary precaution has been taken to cleanse it thoroughly before closing the proximal end. If it fails to close itself, it may subsequently be dissected out.

The following cases are an exception to the deferring of such operations. Where the abnormal opening is at the prepuce, glans penis, or on the scrotum, immediate operation for the restoration of the normal opening should be done. Where the opening is at some remote part of the body, it would be useless to search for the rectal pouch beneath the perinæum. In such cases it will generally suffice to search for, and bring down a loop of the sigmoid or colon, suture, and open it at the normal anal site.

Treatment of Cases in which the Rectum Opens into Some Other Viscus.—When the rectum opens into the bladder, an immediate operation is demanded, or death will result in a short time from infection. The operation always requires an abdominal section. If after opening the abdominal cavity the communication of the bowel with the bladder is found to be high up where it can be reached easily, it is perfectly feasible to divide the channel of communication between them, invaginate the openings into each, and suture them; but there must first be provided some external means of escape for the fecal matter, and this may be done either by means of a proctoplasty or a colotomy. When the opening into the bladder is very low down, and it is difficult to suture with any degree of certainty, it will be better to make a permanent inguinal anus and close up the lower end of the colon entirely.

Now when the rectum opens into the urethra you have a condition far more favorable for operating, nor is there the same need for immediate operation, the rectal pouch being

always lower down, and nearer the pelvic floor. The proximal end of the abnormal channel in these cases may even be utilized, after being divided and enlarged, to bring down and stitch at the site of the normal anus; the remaining portion of the abnormal channel will close voluntarily.

Treatment when the Rectum Opens into the Vagina.— While the abnormal passage may be free enough to allow the exit of meconium, yet an imperforate hymen may obstruct it; a condition readily recognized by the bulging of a greenish membrane between the vulva. This obstruction may be overcome immediately by a crucial incision of the hymen. If the abnormal passage between the rectum and vagina is not sufficient to allow free exit to the meconium it may be dilated by bougies, a uterine dilator, or even incised if necessary, but radical operation for the relief of this malformation should be postponed to a more favorable age, from three to five years. I have now a similar case under observation, a child about two years of age, waiting for a more favorable time. She relieves herself satisfactorily, and is well nourished.

Louis J. Hirschman, of Detroit, Michigan, reported to the American Proctologic Society, June, 1909, two cases where the rectum opened into the vagina, in both of which they had been allowed to continue until adult life, when he operated on both cases successfully by the Rizzoli method.

Alois B. Graham, of Indianapolis, Indiana, reports a similar case of a child eight weeks old, operated on by him October 4, 1909, where the rectum opened into the vagina just posterior to the hymen. The anus was normal, but did not end in a blind cul-de-sac, nor was it occluded by a membranous diaphragm as is usually the case in such abnormalities, but opened into a blind pouch behind a bulging rectum, three inches in length and one-half inch in width. The rectal pouch was found to be attached anteriorly and laterally. The blind rectal pouch was drawn outside the anal margin for more than one inch; the anterior and lateral attachments separated; a longitudinal incision sufficient to admit the index finger

made in the rectal pouch and the rectum emptied of its fæces. The redundant rectal pouch that protruded beyond the anal margin was cut off for about three-fourths of an inch and the edges sutured; the proximal end being attached to the skin at

FIG. 59.—A case where the rectum opened into the vagina and the anus into a blind pouch posteriorly.   (Before the operation.)

FIG. 60.—A case where the rectum opened into the vagina and the anus into a blind pouch posteriorly.   (After the operation.)

the anal margin.   Primary union ensued and the patient made a rapid recovery.   The accompanying illustrations show the condition of the child before and after the operation (Figs. 59 and 60).

I give the method generally used for the relief of this malformation, one recommended by Rizzoli (Gross's " System of Surgery," Vol. ii, page 205, sixth edition) : An incision being made from the posterior margin of the vagina backward to the point where the normal anus should be, the perineal tissues are carefully loosened from their attachments all around and the vaginal anus dissected out intact and dragged down to the position of the normal anus, where it is carefully attached. The perineal tissues in front of the bowel are then brought together by buried cat-gut or deep silver-wire sutures, the mucous membrane of the vagina is also carefully brought together and sutured, thus restoring completely the rectal-vaginal septum, and closing all communication between the two organs.

By this procedure the natural opening in the rectum is preserved with all of its sphincteric power, and, if done under antiseptic measures, the risk of primary union or retraction of the parts is practically nil.

If two openings in the vagina exist far apart, as sometimes happens, it is better to use the one nearer the normal anal opening, as above described. Then dissect out and close the one farther away.

Treatment when the Rectum Communicates with the Uterus.—These are so rare that no definite rule for operating has been laid down. It would seem proper, however, in such cases, first if possible to establish an anus at the normal site, and to follow this by a laparotomy, division of the canal connecting the two organs, an inversion and suturing of the aperture in each.

Treatment when the Rectum and Anus are Normal, but Have Opening into Them the Ureters, Uterus, or Vagina.— In those cases in which the ureters terminate in the rectum, the bladder was found absent, when of course an operation could not be done. When the uterus or vagina opens into the rectum, the same course may be pursued as in the converse conditions already described.

After all the recommendations given for operating on these malformations, it would seem the ultimate results, as shown by Hardouin (*Archives Generales de Chirurgie*, Paris, Nov. 25, ii, No. 11, pages 445–551), are far from being satisfactory, if judged by his summary of two hundred and twenty-three cases of anorectal imperforation, in which six different technics were applied in as many groups of cases.   Fully 55.2 per cent. of the patients succumbed during the first week after the operation; 44.4 per cent. during the first month; 22.8 per cent. were lost sight of during the first year, while the intervention proved successful in 13.55 per cent.—the results known for one year and over—and in 5.8 per cent. for twenty years.   The results with the Littré method were much more satisfactory than with the others, but even at best the functional results of operative treatment are disappointing.   Out of a total of two hundred and twenty-three patients only sixteen lived to puberty and thirteen to adult life.   Stricture is the most formidable complication, but incontinence is frequent and prolapse occasionally observed.   In one case the kidney protruded from the wound.   The Littré method is merely to make an artificial anus in the left iliac region.

AN anorectal fistula is an abnormal channel of communication between the rectum or anus and the surrounding tissues or the surface of the neighboring skin. It originates in an abscess cavity, which, after having its pus evacuated, collapses to form a tortuous canal. If these fistulæ communicate with the rectum or anus, they refuse to heal without surgical intervention, most probably on account of continued reinfection of the canal. They are classified, according to the location and number of their openings, as complete and incomplete.
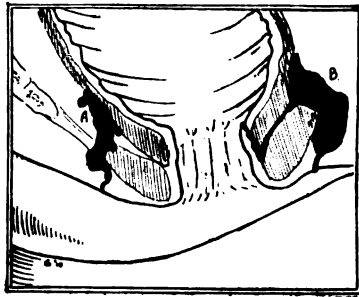
FIG. 61.—Showing complete and incomplete fistula. *A*, shows blind external fistula; *B*, shows complete fistula.

Complete Fistula.—This has both an external opening on the skin surface and an internal opening into the rectum or anus (Fig. 61, B).

Incomplete Fistula.—Here there is but one opening, either into the rectum or anus or on the skin surface. When opening into the rectum it is known as a blind internal fistula, and when on the skin surface only as a blind external fistula (Fig. 61, A). These classifications are sometimes subdivided by the character of the tissues in which the fistula appears, as sub-

cutaneous, submucous, submuscular, and subaponeurotic. They may be simple, when due to infection by ordinary pus organisms; specific, when due to specific organisms, as syphilis or tuberculosis; complex, when there are numerous fistulous tracts with several external openings; complicated, those in which the pelvic bones or the adjoining pelvic organs are involved. The specific types are those due to tuberculosis, carcinoma, and syphilis.

The relative frequency of fistula as compared with other rectal diseases ranges from one-third to two-thirds of the whole number operated upon; the former is probably more correct.

While the large majority originate in an abscess cavity, occasionally they are due to penetrating wounds which extend from the external surface into the rectal cavity, such as gunshot or bayonet wounds, etc. Ulceration and burrowing from diverticula of the upper portion of the rectum and lower sigmoid may also give rise to fistulous openings on the skin surface of the perinæum or in the rectum.

The generally recognized fact that fistula in ano rarely if ever heals spontaneously, gives rise to the question, Why are they the exception? This can readily be understood in the case of a complete fistula, and also of the internal incomplete, which opens directly into the rectum, from which the fistulous tract is constantly being reinfected; but not so with the external fistula, unless its connection with the bowel exists much more frequently than is generally supposed. Its sinus is often so tortuous, its opening so valve-like, that connection with the rectum cannot be demonstrated. I strongly incline to the belief that such an explanation gives a satisfactory solution of the question in a large majority of cases. Many other explanations, such as mobility of the rectal wall due to the respiratory movements, together with involuntary peristaltic action, have been assigned as the cause of these fistulous tracts not healing spontaneously, but I think the one given

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above, namely, its constant reinfection by its tortuous connection with the rectum and imperfect drainage, the only satisfactory one.

Sex.—According to statistics, anorectal fistulæ are much more frequent in men than in women, most likely due to the fact that the former are more exposed to accidents likely to produce perirectal abscesses, and pay less attention to personal cleanliness. While fistulæ are not limited to any distinct age, they occur more frequently in middle life.

Constitutional Causes and Complications.—Any condition that lowers the general vitality predisposes to the formation of abscesses and fistulæ.

TUBERCULOSIS.—As an etiological factor in the production of fistulæ, tuberculosis may act both indirectly through a lowering of the general vitality, and directly, which is far more frequent, by primary inoculation of an abrasion or an injury with the tubercle bacilli, or by a secondary infection, through the lymph- or blood-channels. The finding of tubercle bacilli in the scrapings from fistulous tracts has certainly demonstrated the fact that tuberculous fistulæ are far more frequent than generally supposed, and that such a condition exists in many cases where there is at the time of the operation no evidence of its existing elsewhere in the body, at least in an active state. This has been especially so in my experience, since I have made it a routine practise to have the scrapings from all anorectal fistulæ examined.

SYPHILIS.—So far as is known, the influence of syphilis in the production of fistula is almost entirely secondary to stricture of the rectum, and in such cases the fistula is usually a complicated or complex one, due to perforation of the rectal wall by ulcerative processes and infection of the perirectal tissues. Even though the fistula is a result of simple infection by pus organisms, yet the *Spirochæta pallida* may confidently be expected to be present.

Notwithstanding the probable correctness of the statement just made, that the destructive processes in these cases which

result in the production of fistula are due to the ordinary pus organisms, it is a well-recognized fact that in many it is almost impossible to get such fistulæ to heal, even after being opened up, until the patients are placed upon an antisyphilitic treatment.

Complications.—Two cases of persistent albuminuria have been reported to me by Dr. C. W. McElfresh, in which the albuminuria disappeared entirely after the fistula had been operated upon and had healed, though the albuminuria had persisted for two years before operation.

Symptoms.—The primary symptoms of those attending the formation of the abscess cavity have passed when, as a fistula, it is brought to our attention, so I only take up such symptoms as exist in the different forms of fistula.

Blind External Fistula.—Here the symptoms are a thin seropurulent discharge, with immediate surrounding tissues thickened and brawny; the aperture may close for a limited time, during which the discharge ceases, and is followed by a feeling of fulness and discomfort from the accumulation of pus in the tract, but these latter symptoms disappear upon the reopening of the aperture. This opening and closing of the aperture may go on indefinitely, but it may remain closed long enough to cause the pus to burrow and to open at another point on the surface, or even into the rectum, thus forming what may appear to be a blind internal fistula but in reality one resulting in the formation of a complete fistula, as the external aperture, which has been closed temporarily, will soon reopen.

Upon palpation of the parts lying along the route of the sinus the tissues will be found thickened and indurated; deep pressure will give rise to some pain and will generally result in the emission of a drop of pus at the external opening, even though it may have been temporarily closed. There is little if any pain on defecation; the patient often remains in the best of health, and even increases in weight.

Blind Internal Fistula.—The symptoms of this variety are more obscure, whereas the pain, especially on defecation, is more pronounced and there is more or less spasm of the sphincter present, and if it has existed for any length of time there is likely to be hypertrophy. These symptoms subside and recur with a decrease or increase of the discharge. There is little to be gained from palpation on account of the fistula being so generally deeply seated, unless one finger is introduced into the rectum, when the induration may be felt. If the opening is directly at the margin of the anus, by separating the buttocks well and requesting the patient to bear down, pus can generally be seen exuding from the opening; if not, a single-bladed speculum may be introduced on the opposite side from where the induration has been felt, when by drawing back the opposite wall of the anus the pus can usually then be seen. A probe introduced into the opening with the end bent to the necessary angle to introduce it to the bottom of the sinus will show the depth and direction of the tract.

Complete Fistula.—This variety is far more readily diagnosed than the preceding one. In addition to the symptoms previously enumerated in the other varieties, there is an increase in the discharge, escape of gas and fæces through the opening; also the probe can be readily passed through the canal into the rectum. An examination by palpation with one finger in the rectum will sometimes elicit the indurated tract leading up to the internal opening.

The external opening will generally appear as a pouting tubercle, or a small cicatricial depression; it may appear between the radial folds of the anus, or sometimes, in cases of tubercular fistula, in the midst of a ragged ulceration.

The internal opening may be either in the form of a small papilla, in the midst of an ulceration, or at the base of one of the crypts. When the internal opening is not so readily located, colored fluids, such as methylene blue, or milk, may be injected forcibly through the external opening into the

tract. After waiting some minutes and wiping the fluid care-
fully away from the external parts, the rectum may then be
inspected through a proctoscope for the fluid. This method
is likely to fail if the internal opening is valve-like, and there-
fore is no positive proof that the fistula is not complete. There
is such a condition as a complete intrarectal, or intra-anal
fistula, which consists in two openings on the mucous surface,
connected by a fistulous tract. While this is rare in the rectum,
it is not so in the anus.

There may be many external openings, but all connected
with one abscess cavity by more or less tortuous tracts, and
the abscess in turn is connected with the rectum; the latter,
which is the important one, should be opened up during the
operation. This can best be done by first opening up the
general abscess cavity, when the probe can be easily passed
from that through the internal opening.

The submuscular or subaponeurotic fistulæ are attended
with much graver constitutional disturbances; the pus burrows
much more extensively, and induration of the tract and infil-
tration of the surrounding tissues are much more pronounced
than in the subtegumentary variety.

Origin.—It is very important to determine the origin of
a fistula. The mere fact of one or more fistulous openings
being found near the anal margin, on the perinæum, or but-
tocks, does not necessarily imply an anorectal fistula. The
fistulous tract may even encircle the rectum without entering
it, or the anus, and finally be traced to the urethra, glands of
Bartholin, the ovary, broad ligament, to a necrosed pelvic
bone, even to a psoas abscess, or to a dermoid cyst, which
may break down and rupture into the retrorectal space.

Fistulæ resulting from carcinomas and strictures of the
rectum and secondary to these conditions cannot be relieved
until they are successfully treated.

PATHOLOGY OF FISTULA.—It is very important, whenever
possible, to determine the pathological character of a fistula;
not always easily done until the fistulous tract has been opened

up and the scrapings examined microscopically, unless the external opening is either very large or surrounded by an ulcerated surface. There may be some special local characteristics or general conditions that may lead to a suspicion of the true character of the fistula, especially where there is carcinoma, stricture of the rectum, or pulmonary tuberculosis. Let the latter condition influence our method of operating, even in the absence of positive information from the scrapings of the fistulous tract. In tubercular fistula there is but one absolutely certain method of ascertaining its true character, a microscopic examination of the scrapings from the fistulous tract, and the same can be said of carcinoma and syphilis.

The diagnosis of a urinary fistula, opening around the anus, may be made from the presence of the urine in the discharge, and by the administration of a capsule of methylene blue by the mouth, which will color the urine blue, and if any should come through the fistulous tract it will color it likewise.

Prognosis.—The condition of the patient, the amount of tissues involved and the pathological character of the fistula determine this. The present opinion that fistula is easily cured is by no means borne out by statistics. Tuttle has shown that less than 45 per cent. of 2196 cases collected by him are even claimed as cures, and further says: " A very large majority of the cases of fistula operated upon in hospitals and treated by general surgeons are failures, so far as cure is concerned."

All sinuses diverging from the main channel should be most carefully sought for and opened up; the internal opening sought with equal care; the utmost attention paid to subsequent treatment of the fistulous tract; and even after this has entirely healed let the patient be examined occasionally to ascertain if there has been any subsequent breaking down of it.

Very rarely cases of fistula have been known to heal spontaneously, following the introduction of a probe. I had one such experience in a chronic case, although it was not a com-

plete fistula; but such results are entirely too rare to be hoped for, and would not justify delay in proper treatment.

The unfavorable prognosis given above can be qualified, if the proper care is taken at the time of the operation and with the subsequent treatment.

Prognosis in Tubercular Fistula.—It is a popular opinion, even among many of the profession, that tubercular fistulæ should not be operated upon; an opinion well founded, if applied to cases that occur in advanced pulmonary tuberculosis, for many of these will succumb to the pulmonary disease before the healing of the local lesion, or will likely be very much aggravated by the shock of an operation, loss of blood, or the effect of a general anæsthesia. The most that can be done in such cases is to see that they are properly drained.

These objections do not, however, apply to the strictly local tubercular fistula, as now frequently found. Under proper methods of operating (given later on) and the necessary care and attention in subsequent treatment, the results are most satisfactory. To secure these ends, radical methods should be used to remove the focus of infection, and to preserve the barriers set by nature to prevent a general infection. In addition, take special care to avoid such an infection through any other channel.

Just a word regarding what is meant by " barriers set by nature." Examine carefully the tissues surrounding these fistulous tracts and it will be observed that just outside the layer of granulation tissue there is a fibrous, cicatricial wall throughout their entire extent, and a microscopical examination of a cross section of this infiltrated wall will show you that the number of tubercle bacilli and giant cells gradually decreases the further you go beneath the granulation tissue until they disappear entirely on the denser portion of this infiltrated wall being reached. This is unquestionably a barrier set by nature to protect the tissues beyond this infiltrated mass, and it should be preserved most scrupulously by the surgeon, whatever method may be used for the closure of the fistulous tract.

As an illustration of this condition, I give an instance from my own case book:

G. P., policeman, age forty-five; weight 180 pounds; very robust, with ruddy color, no cough, nor history of any pulmonary trouble, was operated upon by the author, at The Maryland General Hospital, December 29, 1906, for rectal fistula. The left buttock was very much swollen and inflamed; there were several fistulous openings on its surface, which could not be followed far beneath, and there was one just to the right of the anterior commissure into the anal canal. Upon laying open the skin on the buttock, between two of the openings, there was a mass of white fibrous tissue exposed which resembled a capsule, but on incision proved to be a dense mass of fibrous tissue adherent to the subcutaneous tissue. Supposing it to be a tumor which had broken down in places, I made an incision on either side, near each lateral border, for the purpose of dissecting it out, which was done (Fig. 62). The mass measured 6 x 3 x 2 inches, and was found to run deep down between the muscles of the buttocks, which in some instances were involved. The tract from the inner margin of the mass to the opening in the anal canal was then laid open and packed. The cavity left was so large that sutures were introduced to draw the edges partially together and to hold in the packing; and supplemented by adhesive strips (Fig. 63). There were found several large larvæ, supposedly of flies, deep down in the sinuses of the growth. After the mass was taken out it was found to be composed principally of fat, riddled with sinuses which were surrounded by dense fibrous tissue from one-fourth to one-half inch thick. The tapering tail-like process that extended over the trochanter major was composed principally of muscle. Microscopical examination showed the growth to be tubercular in character. The patient made a slow but complete recovery, the large cavity filling in completely, and he is now perfectly well and robust.

James P. Tuttle has seen five cases in which general tuberculosis rapidly followed operations for fistula, done in the manner advised by Salmon, following especially the recommendation to make the incision through the scarred tissues, in order to hasten absorption.

Arthur Hebb, of Baltimore, Maryland, also reports one case of acute miliary tuberculosis following a carefully performed excision of the fistulous tract, yet in all these cases
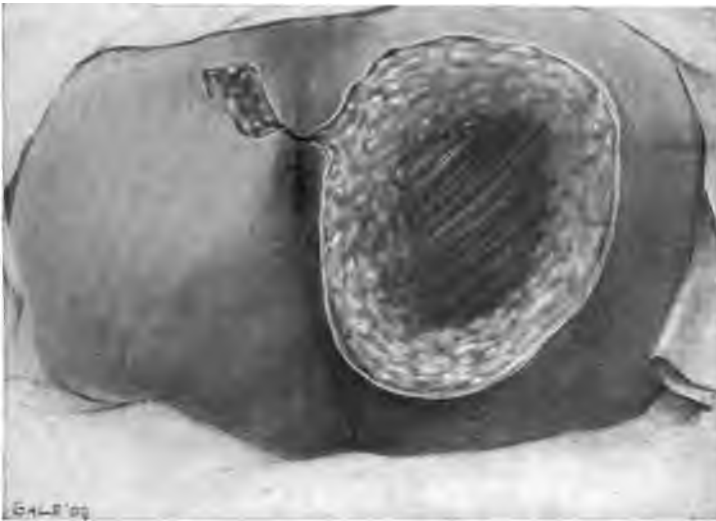

FIG. 62.—A case of tubercular fistula attended with extensive fibrous infiltration that resembled a tumor formation, and it was removed under this impression.

there was neither history nor evidence of a pulmonary or general tuberculosis after a careful physical examination.

It is also a well-known fact, that a number of patients with pulmonary tuberculosis have been seen who were very positive that they never had any cough, or pulmonary affection until after operative interference with their fistulæ. In the light of suggestions so obtained, it is certainly our duty to preserve intact the barrier established by nature between such an infected area and the healthy tissues beneath. Therefore

in operating, even on a suspected case of tubercular fistula, the incision should be made with a thermo, or a galvanocautery knife, and care taken to cauterize only the granulation tissue of the tract, so that it shall not extend through the infiltrated fibrous layer.

Treatment.—This may be either non-operative or operative, according to the nature and severity of the case.

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FIG. 63.—The same case showing the edges of the wound partially approximated by sutures.

Non-operative Treatment.—This does not imply that no cutting at all should be done, but only sufficient to allow the fistulous tract to be drained thoroughly. Make the existing opening larger by nicking its orifice in several places; and if possible, without giving too much pain, let it be sufficiently enlarged to introduce a small, sharp curette with which the canal may be scraped, or possibly cauterized. It is claimed that these measures, together with dilatation of the sphincter, which can be accomplished under local anæsthesia or one of the transient general anæsthetics (nitrous-oxide gas or ethyl

chloride), will suffice to cure many cases of blind external fistula, and for such this conservative method is especially favorable. Failure to heal may reasonably indicate a complete instead of an incomplete fistula.

Under this heading, also, I mention the injection of a saturated solution of nitrate of silver into the fistulous tract of a blind external fistula, which will frequently effect a cure if the variety has not been mistaken and it is not a complete fistula. Bennett, Goodsaull and Miles, however, advocate this method even in cases of complete fistula in which the internal opening is above the internal sphincter. Let this injection be followed immediately by an enlargement of the external opening of the fistulous tract for the purpose of allowing freer drainage. Injections of pure carbolic acid, or equal parts of iodine and carbolic acid have also been recommended, and still another means may be used to obtain the same results by introducing a loop of wire into the fistulous tract and heating it to a dull red heat by an electric current. An increase of the discharge for several days will follow any of these methods after which healthy granulations will spring up, and if the fistulous tract does not close within ten days from the time of treatment it may be repeated several times at such intervals.

While the above methods are generally advised to be tried, first, because many cures can be claimed, and secondly, the risk is avoided that sometimes follows free incision of the sphincters,—incontinence,— I personally have not found them either satisfactory or successful.

Operative Treatment.—Let as thorough a knowledge of the pathological conditions as possible be obtained, in order to guide the operator in the best method to be used under existing conditions.

The use of the elastic ligature for cutting through the fistulous tract by continuous pressure, much in vogue some fifty years ago, need only be alluded to here, because it has become obsolete and has been superseded almost entirely by

the knife, or cautery. The principal objections to that method are that it takes days to accomplish what can be done with a knife, or cautery, in a few moments, and fails to reach any lateral sinuses which exist in connection with the main tract. When they do exist, they have to be laid open with a knife or scissors after the direct fistulous tract has been cut through by the ligature.

I take, then, only three methods for special consideration under this heading; incision, excision, and excision with suture.

PREPARATION OF THE PATIENT.—This will vary somewhat with the chronicity of the case. If the case presents itself soon after the rupture of the abscess cavity, and before the subacute symptoms have subsided, the toilet need only be that used in the preparation of rectal cases generally, namely, thorough scrubbing with green soap; thorough rectal irrigation; shaving the external parts, washing with a solution of bichloride; dilating the sphincter and introducing gauze packing. On the other hand, in chronic cases, especially where there is much purulent discharge, it is well to syringe out the fistulous tract every three or four hours, for one or two days, with a solution of carbolic acid 1–40, or of bichloride of mercury 1–500. The bowels having previously been cleared out by a brisk purgative, given at least twenty-four hours before the time of the operation, let a large enema of tepid water be given about two hours prior to operation.

Alfred J. Zobel, of San Francisco, California, has suggested injecting the fistulous tract with a saturated solution of permanganate of potash, just prior to operation, in order to trace the sinuses in their various ramifications. A solution of methylene blue has been suggested for the same purpose.

The anæsthetic will depend upon the extent of the operation, if that can be properly estimated before proceeding. In superficial cases an hypodermic injection of ½–1 per cent. solution of cocain may be used. As it is almost impossible before opening up the main fistulous tract to know the extent

or direction of the sinuses that diverge from it, therefore the extent of the operation cannot be foretold in most cases, and local anæsthesia is restricted to a limited number; the large majority of them had better be done under a general anæsthetic, either one that is transient, or more prolonged in its effects, according to the gravity of the case. Spinal cocainization can also be used in these cases with very excellent results, by those who are partial to this method.

FIG. 64.—Showing position after the shoulder and knee strap is applied.

The extreme lithotomy position, with the hips well elevated, is the one I find most convenient; the legs to be held in position by the strap that is attached just above each knee, passing over one shoulder, and beneath the other (Fig. 64).

The instruments necessary are a grooved director, probe, sharp-pointed bistoury, a thermocautery for tubercular cases, scissors, artery forceps, curette, needles and needle-holder, if it is proposed to excise and suture the fistulous tract.

Pass a grooved director into the external opening through the tract, until it impinges against the mucous membrane of the bowel, readily felt by the index finger, previously inserted into the rectum. The internal opening is now searched for diligently, and when found, the director is passed through it. The finger is now hooked over the end of the director protruding into the rectum, and this director pulled out through the anal orifice. A sharp-pointed bistoury is then run down the groove of the director, from without inward, and all the tissues held on the director divided at right angles to the plane of the external sphincter muscle. If the course of the fistulous tract runs obliquely to the plane of the sphincter muscle, the tissues covering the external portion of the tract should first be divided down to the margin of the external sphincter, when the course of the director should be changed to a right angle with the sphincter muscle, which should then be divided. If impossible to find the internal opening of the fistulous tract, and yet the point of the director approaching so near the mucous surface that it can be plainly felt by the index finger in the rectum, I think it best to carry the point of the director as high up in the fistulous cavity as it will go without using force, and then push it through into the rectum. By such means you will know you have gotten above the internal opening if one exists in spite of your efforts to find it. Should the director not approach near the mucous membrane, nor pass around the bowel for any distance, you may safely conclude the case to be one of blind external fistula, and all that is necessary will be to enlarge the external opening, curette the cavity, or fistulous tract, stretch the sphincter, and see that the proper drainage is maintained. The opening should close up in the course of ten days or two weeks.

In case it is a blind internal fistula let the director be introduced through the internal opening to the bottom of the previous abscess cavity, and the intervening tissues be divided down to the bottom of the cavity. I have devised a hawk-bill knife for operating on such cases, which will be found very

convenient (Fig. 65). In either of these cases, after the
fistulous tract has been laid open, the granulation tissue should
be gently scraped away with a curette, care being taken that
the curette does not pass through the fibrous layer at the
bottom of the tract.

If you suspect the fistula to be tubercular, it should be
laid open with a thermocautery knife, at a dull red heat, gently
cauterizing the base of the tract also. If the fistulous tract
has run up alongside of the rectum some distance before enter-
ing it, after the division of the mucous membrane, from the
internal opening down, it may be closed by sutures, care being
taken that the site of the internal opening and the remainder
of the incision in the mucous membrane are so carefully closed
to obviate danger from a subsequent leak. This internal open-

Fig. 65.—Earle's hawk-bill knife.

ing may be very high up in the rectum, when there is danger
of dividing a large vessel by the usual incision. In such a
case the mucous membrane may be divided up to the internal
opening by pressure forceps, which are allowed to remain on
until they cut their way through. If there should be more than
one internal opening, the tracts leading to each should be laid
open through their respective internal opening. Diverging
sinuses from the main tract under the mucous membrane
should be carefully searched for and also opened up. By ·
chance the fistulous tract has burrowed beneath the mucous
membrane above the internal opening, making it unnecessary
to extend the incision to the bottom of this fistulous tract, as
the drainage secured by thoroughly opening the tract below
from the internal opening out will be sufficient to secure its
closure. The portion of the fistulous tract outside of the
mucous membrane will then readily close, if properly drained

and occasionally stimulated by local applications. The sutur-
ing of the internal opening, together with the mucous mem-
brane, will very much facilitate the healing of the fistulous
tract. Where there is much cicatricial tissue surrounding the
fistula, it should be dissected out as thoroughly as possible,
provided the operator has eliminated tuberculosis.

Let the wound be now well irrigated with sterile water and
packed firmly with gauze, which should remain from twenty-
four to forty-eight hours. The patient as a rule may be
allowed to get up the second or third day, as the wound drains
better if he is in an erect posture, even though only able to
remain up a few minutes at a time; his general condition will
be much improved thereby.

After the first packing has been removed, the wound should
be irrigated with sterile water, or a weak antiseptic solution,
twice a day, and for some days several thicknesses of gauze
may be laid between the freshly-cut surfaces of the wound to
prevent them adhering together.

Excision of Fistula.—This is a very effectual and satis-
factory means of treating direct or complete fistula, where the
amount of scarred tissue is not too extensive, and the cut ends
of the sphincter would not be kept too far apart after the
wound has healed. This is a very old method, having been
practised long before that of simple incision, and is best
adapted to old chronic cases, special care being taken not to
destroy much of the external sphincter.

EXCISION WITH IMMEDIATE SUTURE.—With the inception
of antiseptic surgery it was natural to infer that this method
would be eminently successful and the one always chosen in
direct fistulæ when not extending very deep or opening too
high up in the rectum. Results have not nearly measured up
to the expectations of the surgeons, having been followed by
frequent recurrences, which were most likely due to sinuses
extending beyond the excised area. As a result, the opera-
tion is not half as frequent as it was a few years ago. Not-
withstanding, it should not be discarded entirely, but used

in short superficial and direct fistula, also in those superficial
tracts that extend out on the buttocks, if the same are simple
in character. All should be done under the most rigid anti-
septic technic, especially with regard to previous treatment of
the fistulous tract for several days, by injections of antiseptic
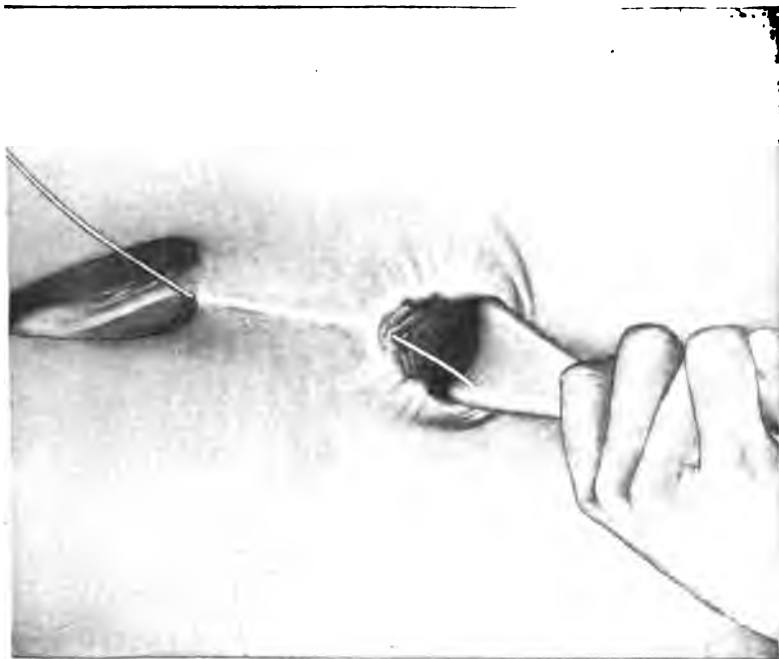solutions. The sphincter should be stretched, as previously
recommended.

FIG. 66.—First step in excision of fistula. (Tuttle.)

James P. Tuttle has probably the best and most ready
means of doing the operation. He passes a long flexible silver
probe through the fistulous tract from the external to the
internal opening (Fig. 66), and allows the ends of the probe
to extend beyond each opening sufficiently long so that, when
bent upon itself, it will form a sort of traction loop by which
the fistulous tract can be elevated above the surrounding
tissues. An incision is made from one opening to the other

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directly over the probe. After passing through the skin, the dissection is then deflected to each side, until it extends beyond and beneath the infiltrated fibrous layer, and continued until the dissection on each side meets beneath the floor of the fistulous tract. Special care should be taken to dissect out and leave intact the fibres of the external sphincter which project over, and external to, the fistulous tract (Fig. 67).
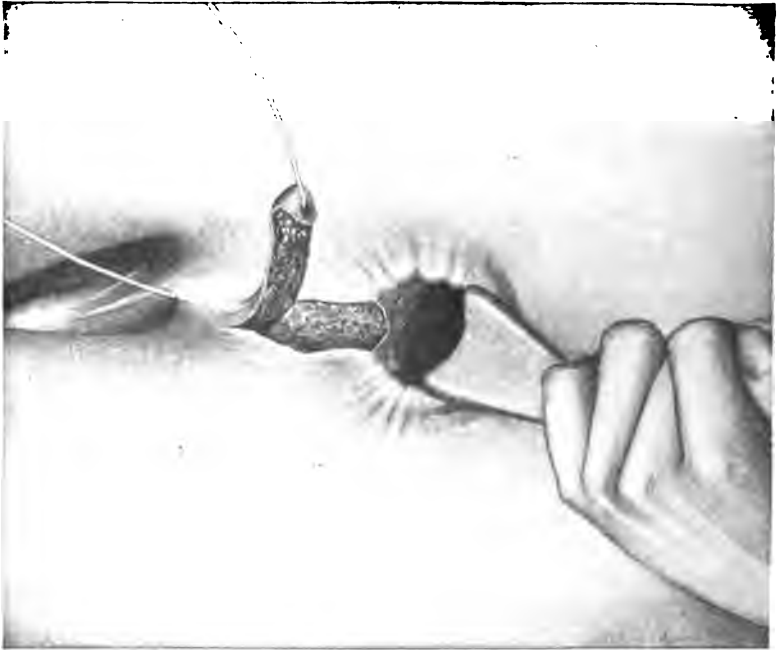
FIG. 67.—Removal of a fistula threaded upon a probe. (Tuttle.)

It will be seen that the fistulous tract with its surrounding infiltrated fibrous mass is thus removed intact when properly done and does not infect the fresh wound. If for any reason the latter becomes infected from the fistulous tract, either from inadvertently opening into it, or from having cut through a diverging sinus, the subsequent part of the operation, namely, the immediate suture, had better be abandoned and the wound treated as in simple excision.

The tract being removed satisfactorily, application of the
sutures for the closure of the wound is the next step.   To
avoid too much tension on the internal sutures, pass several
silkworm-gut sutures from one side of the wound to the other
and beneath it; these to be only drawn taut and tied after the
wound has been closed.   The deeper portions of the wound
are now brought together by small-size silk sutures, cat-gut

Fig. 68.—Method of introducing the sutures after excision of fistula.   (Tuttle.)

in any form being too uncertain to warrant its use in what
should be a perfectly clean wound.   If the incision is deep,
two rows of continuous silk sutures should be used in closing
the wound (Figs. 68 and 69).   Pay special attention to bring-
ing the cut ends of the external sphincter in apposition and
holding them together by interrupted sutures; there should also
be a reinforcing suture either of silkworm-gut or silver wire,

for holding in position the ends of the sphincter, and to relieve the strain upon the interrupted silk sutures; place this just at the margin of the skin and mucous membrane. The entire length of the incision should now be sealed with iodoform collodium. A slip of iodoform gauze should now be laid over the wound, and especial care taken to introduce it within the
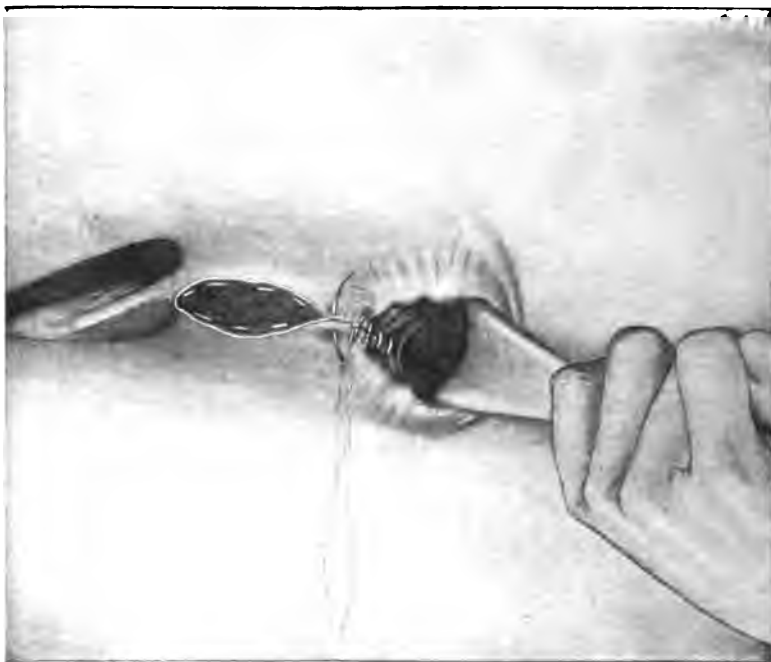
Fig. 69.—Final step in closing fistula. (Tuttle.)

anus, letting it cover and protect the inner angle of the wound. Let a single-bladed speculum now be introduced into the rectum over these dressings so as to hold them in position while the packing is being removed from the rectum. Now introduce a medium-sized drainage-tube, wrapped with gauze and rubber protective, and leave it in the rectum, when the external dressings may be applied. A hypodermic of morphia,

¼ grain, can now safely be given to control the pain, and to confine the bowels for five or six days; this may be repeated every two or three hours until the pain is relieved.

The diet should consist of egg albumen, broths, eggs, a small amount of meat, and a very limited allowance of bread; after the third day, fruit juices followed by stewed fruits may be given. The patient should be confined to bed until after the bowels are moved. On the fifth day ½ ounce of olive oil should be administered midway between the meals, and at bed-time; this to be followed by 2 drams of compound liquorice-powder early on the morning of the sixth day, and repeated in six hours if not effectual.

When this method succeeds there is a very decided gain in time of healing and functional results over the open incision, and the patient should be given the advantages of such a method in properly selected cases. A failure can be recognized directly after the first movement of the bowels and the wound then laid open under the influence of local anæsthesia, when the patient will be in exactly the same position as though the method of excision, without suture, had been used in the first instance.

Complex Fistula.—Any perirectal abscess may result in a complex fistula. If the inflammatory stage has involved a large amount of tissues around the anus and rectum, or an ordinary-size abscess has been badly drained, it will lead to extensive burrowing and result in such.

These are sometimes characterized as watering-pot fistulæ (Fig. 70), on account of the numerous external openings to the tortuous tract, and, again, as "horseshoe" fistulæ when they assume this shape, extending almost around the anal margin. Goodsall, pointing out the rules of extension of fistulous tracts, says: "Those in the anterior quadrant proceed directly into the anus or rectum, the aperture being found almost perpendicularly above the external opening. Those in the posterior quadrants extend circularly around the anus, and generally open at some point near the posterior com-

missure. Subtegumentary fistulæ may burrow subcutaneously in all directions, because there are no connective-tissue walls to obstruct them. Those situated anteriorly are likely to extend forward into the perinæum and scrotum or upward into the cruroscrotal folds. Those situated posteriorly burrow outward into the buttocks, or upward behind the coccyx and sacrum beneath the skin."
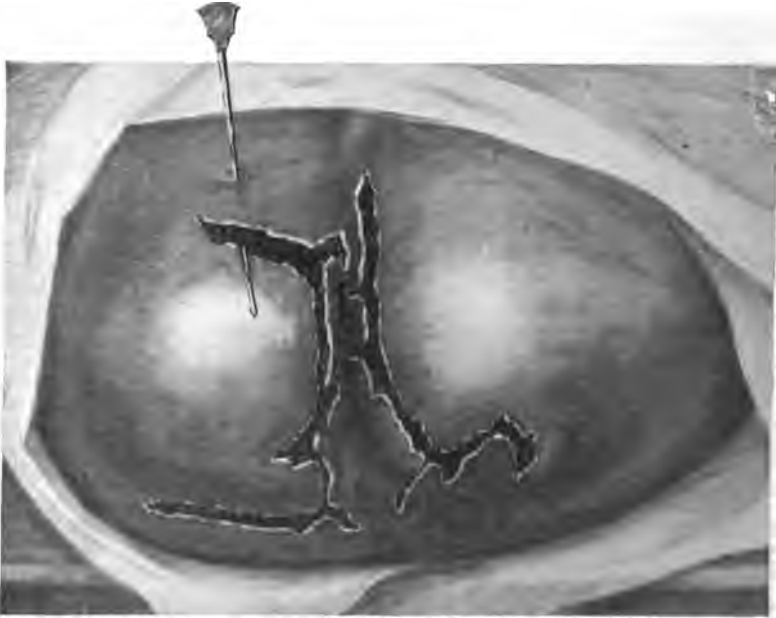

Fig. 70.—Complex fistula.

It is remarkable to what extent these subcutaneous burrowings may extend. The subtegumentary fistula so frequently found associated with pruritus ani is very likely to burrow entirely around the external anal orifice just beneath the true skin, but rarely extends far out on the buttocks or up the perinæum. Chronic cases are likely to have several internal openings, but these may be very superficial and not extend beneath the fibres of the sphincter.

Submuscular fistulæ may extend from one ischiorectal fossa to the fossa of the opposite side, or into the retrorectal space.

The treatment of complex fistulæ consists in the incision and thorough drainage of every fistulous tract, or, when very superficial they may be excised and sutured immediately. In the case of those which open at a remote distance from the anus, it would be better to make counter-openings every few inches from the external opening, and insert in them drainage-tubes; this method to be continued until within about two inches from the anal margin. From this point to the internal opening, let the fistula be treated as previously recommended in complete fistula, by dividing all the intervening tissues between the last counter-opening and the internal opening of the fistula. This last incision should be treated as previously recommended in complete fistula. If any lateral tracts from the main fistulous canal exist they should also be opened and drained.

The condition previously spoken of as watering-pot fistula, while not implying a corresponding number of internal openings (as there is generally only one in such cases), does bear some relation to the size of the internal opening, to the constitutional condition of the patient, and the duration of the fistula (Goodsall and Miles, page 117). The internal openings in these cases are likely to be large, to occur in syphilitic patients, and generally indicate a chronic stage of the fistula.

FISTULA WITH MORE THAN ONE INTERNAL OPENING.— There may be present two or more, connected with one fistulous tract, or there may be two, each being connected with separate and distinct fistulæ. It is possible that the two distinct internal openings may have originated independently, and yet their tracts may communicate with a tract common to both with only one external opening. After the wounds following these extensive fistulæ have healed, if much retraction of the rectum, or much incontinence is found, the cicatrices may be dissected out, the anus loosened from its new attachments and brought down and sutured in its normal position. ·

COMPLICATIONS ATTENDING AND FOLLOWING OPERATIONS FOR FISTULA

The complications attending and following operations for fistula may be immediate or secondary.

Immediate Complications.—While excessive loss of blood following an operation for fistula is an unusual occurrence with the efficient means we now have at hand for controlling the same, yet in cases where the incisions are very extensive and deep a great deal of blood may be lost simply from oozing, this, in the weakened condition of many patients, having a serious effect and demanding prompt control.

Let spouting vessels be clamped and ligated at once, and the oozing controlled by compression with gauze, either wrung out of very hot water or in the dry state. Do this as the operation proceeds, and to control this oozing in the final dressing I rely upon tight packing, which is allowed to remain in from twenty-four to thirty-six hours.

Hemorrhage is more likely to follow operations done under cocain anæsthesia, on account of the temporary contraction of the arterioles by the drug, which relax as soon as the effects of the drug wear off, and also from the systemic effect of the cocain in raising blood-pressure. For that reason, after cocain anæsthesia the patient should be kept quiet for several hours. For the same reason extensive operations under cocain should not be attempted in the office.

Where there are extensive fistulous tracts about the anterior quadrant and in the perinæum, special precautions must be taken against injuring the urethra; a sound introduced as a guide to avoid wounding the urethra, and any undue manipulation, which may result in acute congestion, temporary œdema, and constriction of the urethral canal, avoided. In packing this wound take care not to use sufficient compression to obstruct the urethra and cause retention of urine.

After restoration to consciousness, following the anæsthetic, if there should be an urgent desire to defecate, it will be better not to restrain the patient too long, as it may be due to a concealed hemorrhage, which would be made known by an evacuation.

Shock.—This is more likely to follow those operations where there has been a considerable loss of blood, or extensive cauterization. It can be met by an infusion of normal salt solution, and hypodermics of strychnia, digitalin and morphia, especially the latter.

Sepsis.—Notwithstanding the fact that pus is always present in these cases, there may be a diffuse periproctitis following an operation for fistula. This may be due to a reinfection with pus organisms from the fistulous tract, or there may be an infection of the freshly-cut surfaces with a more virulent pus organism, which has been introduced by the carelessness of the operator. Therefore take every precaution against so introducing a pathogenic organism.

I once had a case of infection by the erysipelas organism, through the carelessness of a nurse when the patient had almost recovered from the operation for fistula, and was just about to be discharged from the hospital. It developed at the seat of the operation and soon caused death.

Of late complications following operation for fistula, one of the most annoying is incontinence of fæces. This was formerly more common than now, due, I think, in many cases to the prolonged packing of these wounds after the operation. As to packing, let it be done principally for the purpose of controlling hemorrhage, and keeping the freshly-cut surfaces separated 'for a few days until they have become glazed over; after which, the daily separation of the cut surfaces for the purpose of irrigating the wound will be sufficient to keep them apart.

The next most frequent cause for incontinence is a diagonal or jagged incision of the external sphincter muscle, resulting in a bad union of the cut ends. Incontinence may also

result from over-divulsion of the sphincter when associated with some form of spinal trouble; in such cases the proper muscular tone is never regained. To avoid such an accident cut the external sphincter muscle squarely across, and never oftener than once during the same operation, if it can possibly be avoided.

Treatment of Incontinence.—Little can be accomplished without operative interference. In the opinion of most writers on this subject the condition is the result of the separation of the fibres of the external sphincter muscle by scar tissue, or a complete separation of these fibres, or prolonged packing during the process of healing, which results in a sulcus or gutter which separates not only the fibres but all of the adjoining tissues. Thus the muscle in contracting pulls the sides of this sulcus farther apart and rather increases than lessens the opening. The loss in the continuity of the sphincter muscle being the cause of the trouble, the remedy lies in the restitution of the same as nearly as possible. The success of this procedure depends upon the amount of its destruction during the operation, the extent of the subsequent sloughing, and the length of time that has elapsed since the operation, which will determine the amount of muscular atrophy.

The method generally advised is to take a V- or wedge-shaped piece out of the obliquely-united muscle, which should also include the scar tissue of the wound (Fig. 71).

The technic is as follows: First incise the mucous membrane at the skin margin, parallel to the fibres of the sphincter muscle; then carefully dissect it up until it is above the bottom of the sulcus and the underlying scar tissue; this is held out of the way until the ends of the muscle have been sutured, when it is brought down and sutured to the internal margin of the wound. The wedge piece of scar tissue is now removed down to the healthy tissue, the apex of which should be internal, with its base external. This divides the muscle at right angles with the plane of its fibres, shortens the muscle, and permits an end-to-end approximation of its fibres. They

should be secured in this position, first, by interrupted silk sutures, and next by a silver-wire brace suture, which is passed about half an inch outside the silk suture on one side, and carried beneath the floor of the incision out on the opposite side, half an inch beyond the silk sutures; it is intended to relieve the tension of the latter. The ends should be drawn together, and secured over a piece of sterile gauze.

FIG. 71.—Showing V-shaped incision to be made for removing scar tissue before approximating the ends of the sphincter ani.

The wound is now dressed with sterile gauze, the buttocks strapped with adhesive strips, and a T-bandage applied to hold the dressings in position.

Keep the patient in bed until the seventh day; his bowels to be confined for about six days, during which time milk should be positively forbidden, and the diet restricted to eggs, a small portion of fresh meat, and only a sufficient amount of fruits and green vegetables to prevent the fecal matter from packing in scybalous masses. The day before the bowels are to be moved, olive oil should be administered in half-ounce

doses at eleven, four, and nine o'clock, the object being to soften the fecal matter. On the following day, half-ounce doses of castor oil should be given every four hours, until the bowels are moved. When the desire for a movement arises, about four ounces of cotton-seed oil should be injected into the rectum.

Should any portion of the wound become infected, it should be laid open immediately, washed out thoroughly with peroxide of hydrogen and well drained, but unless it involves the entire wound it will not be necessary to open the latter throughout. If the sphincter has been divided on both sides of the anus, it will be better to restore it on each side at separate sittings.

When the muscular fibres have become atrophied from long disuse, following the operation for fistula, or from very extensive destruction of the sphincter, it is very difficult to restore continence, except in a partial manner by narrowing the anal outlet. In such a condition Dr. Chetwood, of New York City, has succeeded in restoring continence by a very ingenious plastic operation. This consists in making a semi-circular incision, extending from one tuberosity to the other, its convexity being directed backward over the coccyx, and a little beyond it (Fig. 72). The flap is turned down and dissected forward to a point anterior to and around the anus, but the skin is not separated from the anal margin. This exposes the lower end of the rectum and the edges of the glutei muscle. A ribbon-shaped piece of muscular tissue about one-fourth of an inch in breadth and one-sixteenth of an inch in thickness is then dissected from the edges of the glutæi muscles on each side, allowing the end to remain attached to the coccyx. These ribbon-shaped bands are crossed to its opposite side and in so doing are carried beneath the ligamentous attachment of the anus to the coccyx and made to encircle the anus; where the two are united by chromicized cat-gut (Fig. 73). A very small remnant of the sphincter was found on each side of the rectum, to which the muscular

strips from the glutei muscles were attached by sutures. The skin flap is then sutured back in position and the wound closed with aseptic precautions. There was some slight sloughing in the edges of the wound, otherwise it closed without being attended with any complications. The patient's control over his fecal discharges was established at once and one year later it was sufficient to control them under all conditions.
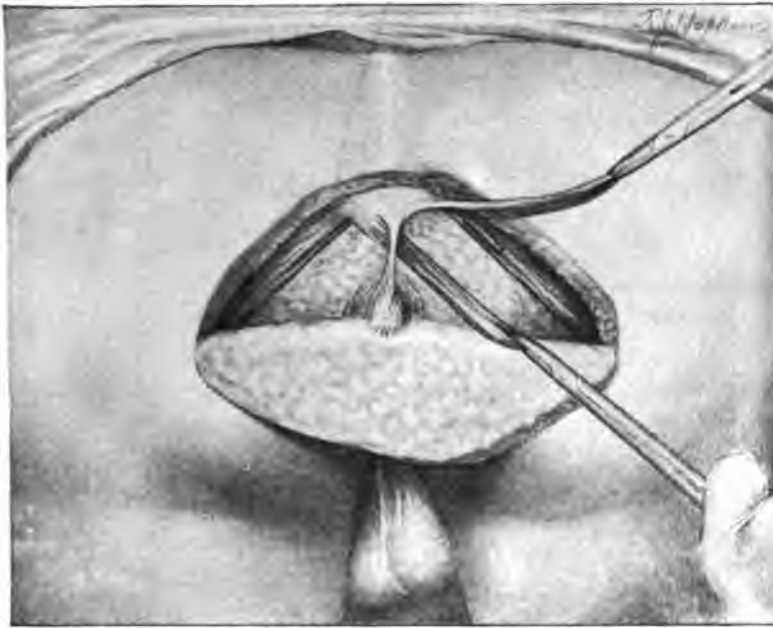
FIG. 72.—Chetwood's operation for fecal incontinence—first step. (Tuttle.)

If for any reason this method could not be used, or failed to give the desired result, it would be justifiable to perform a left inguinal colostomy, with the recent recommendation of bringing the bowel out beneath a loop of the internal oblique, through an incision in the external oblique muscle. This gives the patient very excellent control over his fecal discharges, and where supplemented by the compress and receiver (Fig. 119) is very satisfactory.

Sometimes internal hemorrhoids, or the mucous membrane itself, may protrude into the fistulous wound and thus retard healing. They should be removed, if observed at the time of operation, but if then overlooked should be removed at any subsequent time interference with the healing of the wound is noted. I have never seen any bad results following their removal at the time of operation for the fistula, but it is probably safer to remove them by the clamp and cautery if there is much suppuration going on in the fistulous tract.

When removed subsequently to the operation for fistula, it may be done under cocain anæsthesia.
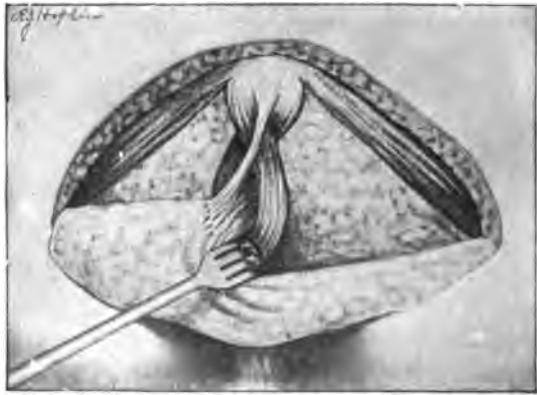
FIG. 73.—Chetwood's operation—second step. (Tuttle.)

Protracted Suppuration following the Operation for Fistula.—This sometimes happens on account of the depleted condition of the patient, or where there is syphilis, Bright's disease, diabetes, cardiac disease, or pronounced anæmia. These conditions should be recognized before the operation and influence the extent of cutting to be done, no more than is absolutely necessary being done.

If the superficial edges of the wound should unite prematurely, they should be separated at once, and the wound made to heal from the bottom.

Complicated Fistulæ.—These originate in bone or adjoining organs, and open into the rectum or around the anal margin.

FISTULÆ THAT ORIGINATE IN DISEASED BONE.—In disease of the pelvic bones, or the spinal vertebra, from any cause that gives rise to suppuration, the pus is likely to burrow between the sheaths of the muscles and layers of fascia, until finally it gravitates to the most dependent position, which in this instance is in or around the rectum.

The point at which the pus accumulates and which finally becomes the abscess cavity is not attended with the acute inflammatory symptoms found in abscesses originating in this region, such as chill, local redness, induration, and pain, but develops as a cold abscess, with a dull, heavy aching in the pelvis, and at first with an indistinct swelling, which is not attended with induration. These collections of pus generally give rise to so little inconvenience that they are likely to open spontaneously, especially into the rectum, before the patient seeks surgical advice. These openings may be anywhere in the rectum, on the perinæum, or on the buttocks. While they are likely to burrow into the rectal space that is nearest to the diseased bone or organ in which they originate, such is not always the case, so that the location of the spontaneous opening does not always give a clue to the origin of the primary trouble. The extent to which pus may burrow in certain of these cases is very surprising.

DIAGNOSIS.—Prompt recognition of the fact that the abscess or fistulous tract in question originates in diseased bone, or in an adjoining organ, and not in the perianal or perirectal tissues, is very important, as it has an important bearing upon the course of the treatment to be pursued. Often in such cases it will either be impossible to reach its source or impracticable to remove it if it can be reached; therefore the treatment consists largely in giving free drainage at the most dependent part, followed by frequent antiseptic irrigations. If the diseased bone can be reached, and removed by scraping, it should

be done by all means, and better through an opening directly over the seat of the trouble; but this must not interfere with enlarging the lower opening to give free drainage to the fistulous tract. These surgical means of relief should be followed by general supporting treatment. The sphincter muscle should always be preserved intact if possible, even though an internal opening from the fistulous tract into the rectum should be found; in such a case, either the internal opening must be enlarged, or, much better, tap the fistulous tract by an opening from the outside, but do not cut through the intervening tissues so as to divide the sphincter.

I have recently been using the tuberculin test for diagnostic purposes with satisfactory results in all cases of fistula in ano, after the method recommended by Louis Hamman and Samuel Wolman. I use the conjunctival and the cutaneous test simultaneously; if results are negative, then the subcutaneous test. I instil one drop of 1 per cent. of old tuberculin (Calmette's preparation) into the eye and make several scarifications in the back of the arm, on which I drop several drops of the tuberculin solution and after four or five minutes strap a piece of gauze over the scarification. If there is any reaction it will show by the following day. If both methods are negative and I desire to make my diagnosis still more positive I then resort to the subcutaneous method. If this is also negative and there are no general symptoms to indicate it, I feel fairly sure of having neither a tubercular fistula nor subject to deal with. As Hamman and Wolman have very properly said, " These tests can never replace in the slightest degree a carefully taken history of a well made examination; they are aids and nothing more."

Fistulæ Originating in Other Organs.—Fistulæ originating in or connected with other organs, and opening into the rectum or around the anal margin, are very properly classified by the name of the organ in which they originate; as, for instance, urinary or genital. The first or urinary is always connected with some part of the urinary tract, as with the

urethra, bladder, or ureter. The first two appear almost exclusively in males, owing to the fact that the urethra and bladder in the female are separated from the rectum by the vagina and uterus. It is, however, possible to have a vesico-rectal fistula in a female. The genital fistulæ are mostly found in women. Occasionally a superficial subtegumentary fistula may be found burrowing on the surface of the scrotum. Abscesses occurring in the prostate or Cowper's glands may break through into the rectum without communicating with the urinary tract, and although they form blind internal fistulæ (before described), yet strictly speaking they are rectogenital fistulæ, unless they open into the urethra at a later period.

Urinary Fistulæ.—These may be divided into perineal, recto-urethral, recto-ureteral, and rectovesical.

PERINEAL FISTULA.—Fistulæ originating in the urethra are frequently found opening on the perinæum and occasionally even surrounding the rectum before doing so. They simulate so closely the anorectal fistula that it is well for the operator to bear such a possibility in mind. They usually originate from disease in the bulbous portion of the urethra, or in Cowper's glands. As these form the anterior boundary of the urogenital triangle and are included between the layers of the deep and superficial fascia, it is easy to understand how extravasated urine or pus will find its way through this triangle, and thence backward beneath the skin and perineal fascia around the anus. In these cases there is nearly always a history of urethral disease, such as gonorrhœa and stricture. There is also likely to be an absence of the usual symptoms attending an anorectal abscess. The presence of urine in the discharge from the fistulous tract, or the odor from the same, may give rise to suspicion of its true character, which may be confirmed by compression of the urethra while in the act of voiding urine; then by watching the fistulous opening, urine will be seen to flow from it. Another method consists in giving the patient a small capsule of methylene blue, which

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will stain the urine in the course of a few hours, and can be recognized at the opening of the fistulous tract if it is connected with the urethra.

Treatment.—This consists in a simple incision, and a laying open of the fistulous tract to a point just beneath its connection with the urethra, attention being given to the treatment of the primary urethral disease, especially to the dilatation of any stricture that may exist, and to making the urine as non-irritating and aseptic as possible.

RECTO-URETHRAL FISTULA.—This consists of a fistulous tract between the urethra and the rectum. It always involves the membranous or prostatic portion of the urethra, and as a rule the opening into the rectum is above the external sphincter. This condition is rare, and as it almost invariably has its origin in the urethra properly belongs to the genito-urinary surgeon. For the same reason it might be proper to designate the condition as urethrorectal fistula.

Etiology.—The causes apt to produce this condition may be either traumatic or pathologic. Of the former the most frequent causes are punctures through the urethra by sounds or catheters. It is not necessary that complete penetration take place in order that a fistula may result. If the urethral wall be only slightly torn, an abscess is almost sure to follow from the extravasation of the urine, in which case it will likely break into the rectum, this being the direction of least resistance. The operations of prostatectotomy or internal urethrotomy may each result in the formation of a fistula between the urethra and rectum; also traumatism of the perinæum, which is followed by extensive sloughing. Among the other causes of recto-urethral fistula are cancer of the rectum or prostate, tubercular, syphilitic, or simple ulceration of the rectum, and calculi of the prostatic or membranous urethra.

Congenital recto-urethral fistulæ are not included among the above, as they belong to the class of malformations.

DIAGNOSIS.—The characteristic symptoms upon which the diagnosis for recto-urethral fistula depends are the passage

of urine into the rectum, or escape of gas and intestinal contents into the urethra; the one in which the opening is on the higher plane will determine the character of the abnormal discharge. The presence of urine in the rectum is much more frequent than the presence of gas or fecal matter in the urine, because the prevailing diseases which give rise to this condition originate in the urethra, and its plane is on a higher level than the opening into the rectum generally. When the fecal contents do pass into the urethra, the opening at the rectal end of the fistulous tract is always large. When the urine passes into the rectum, which is of course only at the time of micturition, it is generally expelled immediately, although sometimes there is a tolerance of the urine by the rectomucous membrane, and a retention of it until the next act of defecation. In these cases spermatozoa may also be found in the urine which has passed into the rectum.

When either the urine passes into the rectum or the fecal matter passes into the urethra, they set up inflammatory symptoms and there is generally diarrhœa or frequent micturition. According to Richet, the sphincter muscle loses its control in these cases, and Legueu states that the skin upon the buttocks and perinæum becomes excoriated.

Usually the rectal opening can be felt by digital examination, and where this is large enough to admit the tip of the finger a sound introduced through the urethra can be felt. By the aid of a single-bladed speculum, the rectal opening can be exposed and a probe passed into it.

Recto-urethral fistula can be differentiated from the recto-vesical, by the fact that in the latter the urine flows into the rectum nearly continuously.

Where recto-urethral fistulæ result from operative procedures the prognosis is favorable.

Treatment.—There is little tendency to heal spontaneously in cases resulting from diseased conditions, nor is the success of tentative measures sufficient to warrant their use except in cases following operations, those due to traumatism and those

which follow acute and circumscribed abscesses. These may be treated by antiseptic irrigations, stimulating applications, and catheterization of the parts.

Of the different operative procedures which have been recommended for the relief of the more chronic and aggravated cases, and they have been numerous, the author recommends that advised by Hugh H. Young, of Baltimore, Maryland:

"After," he says, "trying various methods, as simple dilatation of the rectum, division of the anal sphincter and laying bare the perineal rectal fistula, closure of rectal fistula alone, simultaneous closure of both rectal and urethral fistula, with drainage through a catheter in penile urethra, through a bulbous urethrotomy, or through the urethral fistula itself, I became convinced that it was necessary to remove the necessity for urination through the urethra, or of drainage through the urethra, in order to prevent breaking down of the rectal wound. I therefore decided to supply suprapubic drainage so that all urine might escape through the suprapubic region and the spasmodic efforts of urination be done away with, followed by the simultaneous closure of both the rectal and urethral fistula through the perinæum. This operation has been carried out in three cases with a perfect closure of the rectum in each case, and in these same cases there was always a breaking down of the rectal wound when the suprapubic drainage was not provided. *It therefore seems evident that the best operation for recto-urethral fistula is preliminary suprapubic cystostomy, followed by closure of the rectal and urethral fistula through the perinæum.*

"The operation is best done in the following manner: The patient is placed in the Trendelenburg position, and the bladder filled with fluid through a silver catheter. An incision 1½ inches long is made in the skin, the recti muscles separated, and the anterior surface of the bladder exposed after pushing back the peritoneum. Two silk sutures are inserted

into the bladder wall not too close to the prostatovesical junc-
ture and the bladder incised, a long drainage-tube about the
size of the little finger is then inserted and the bladder closed
tightly around it with cat-gut. The tube should not project
more than 2 cm. into the bladder, so that its end does not
impinge against the prostatic orifice or trigone (the opening
high up on the bladder wall having been made so for the same
reason). A small gauze wick is placed in the prevesical space
and the recti muscles and skin are partially approximated with
interrupted sutures of silver. The patient is then placed in
the lithotomy position, and a probe inserted through the fistula
into the rectum and one also (if possible) into the bladder.
A sound is inserted in the urethra. Incisions are then made in
the perinæum along the line of the operative cicatrix, and the
scar tissue around the fistula excised carefully as far as the
urethra and rectum. The edges of the two fistulæ are then
excised until healthy tissue is obtained.

" The rectum is closed first with interrupted sutures of
fine silk, the first layer through the submucosa and turning in
the mucous membrane, but not including it. The second layer
includes the musculosa and is also of silk. The third layer is
of cat-gut and includes additional musculosa and perirectal
muscle, so as to cover in the previous sutures with a thick
pad of muscle. Attention is then directed to the urethral
fistula, which is closed with one or two layers of interrupted
cat-gut, or very fine silk sutures. (The rectal wound is the
most important. There is usually less tissue to approximate
around the urethra.) Before closing the skin a light pack of
gauze is placed in. the rectal and urethral wounds and the
levator muscle drawn well together over the rectum with two
or three sutures of cat-gut. The skin is partially closed with
interrupted cat-gut, the gauze wick emerging from the anterior
angle. Before leaving the table the bladder is washed free of
blood by a to-and-fro irrigation through the suprapubic tube.
After the patient is returned to the bed the suprapubic tube

is placed in a bottle on the floor with the end immersed in water so that siphonage will be secured. (This does away with the necessity of a Cathcart apparatus.)

" The bowels should be kept quiet for at least six days, If they have been thoroughly emptied two days before operation, and the patient has been on milk diet for three days, little difficulty is experienced in preventing defecation for a week. It is best to give a lead and opium pill for two or three days and to confine the patient to liquid diet. At the end of six days the bowels are moved with as little straining as possible. This is best accomplished by injecting a small amount of oil and glycerine into the rectum to be retained, and giving the patient an ounce of castor oil by mouth followed two hours later by Rochelle salt. In this way successful evacuation of the bowels is accomplished with little straining and without the necessity of large enemata, which are distinctly objectionable (not to say dangerous) after all prostatic operations."

Rectovesical and Enterovesical Fistulæ.—These consist of abnormal communications between bladder and rectum, and between the bowel above the rectum and the bladder. The rectovesical fistula may result from tapping the bladder through the rectum, a practice now obsolete; from accidents, as bullet wounds, punctures by pointed pieces of iron and wood; foreign substances in the rectum; stone in the bladder; from operations on the bladder and rectum for malignant disease, and from destructive inflammatory processes. Ulceration of the bowel, either of the sigmoid or the small intestine, especially tubercular or syphilitic in origin, may cause at first adhesions with the bladder and then by extensive ulceration a fistulous communication between the two. This is much more rare than the communication between the rectum and bladder, as shown from statistics. Of the eighty-nine cases reported of fistulous communication between the bladder, rectum, sigmoid and small intestine, in thirty-eight the communication was with the rectum. (James P. Tuttle, " Diseases of the Anus, Rectum, and Pelvic Colon," page 440.)

DIAGNOSIS.—When the fistulous opening is between the small intestine or the sigmoid and the bladder, the diagnosis is made by the presence of fecal matter or gas in the urine; when the communication is between the upper part of the rectum and the bladder, it may either be the same or as when the opening is in the lower part of the rectum, by the presence of urine in the rectum. In the large majority of cases, however, the diagnosis will be made by the presence of urine in the rectum. The other symptoms will be similar to those previously described under rectovesical fistula.

Symptoms.—Cystitis or proctitis, either the one or the other, will always be present, depending upon which receives the discharge from the other. Pus and blood may be contained in the discharges of either, especially if the fistula is the result of a pelvirectal abscess or the breaking down of a malignant growth. Where the fistulous communication is due to either of the latter two causes, the previous symptoms, together with the induration attending upon the latter, will indicate the primary cause.

The proctoscope, the sigmoidoscope, and the cystoscope will in the large majority of cases enable the surgeon to locate the openings into both bladder and bowel, except when in the latter the opening is in the small intestine.

The prognosis is very grave, especially where the fecal contents empty into the bladder, where the resulting inflammation soon extends up through the ureters to the kidneys, giving rise to " surgical kidney," the most frequent cause of death. In those cases where there is an intervening abscess cavity between the two openings the escape of urine and fecal matter into this cavity is likely to result in urinary infiltration, or burrowing tracts which may perforate the peritoneum giving rise to fatal peritonitis, or if they burrow down to the buttocks, or around the anus, may result in extensive sloughing and suppuration, which soon results in exhaustion and death.

Treatment.—As the most unfavorable cases are those where the fecal contents empty into the bladder, it is obvious that the first and most important step is to divert the fecal current; this can be accomplished by a temporary artificial anus, unless the opening is into the small intestine. If permanent catheterization be associated with the artificial anus, the two may result in the spontaneous closure of the fistula. If the tract fails to close spontaneously under these conditions, if the rectal opening is low down it may be closed by making the surrounding surfaces raw, and drawing them together with chromicized cat-gut sutures, the same being so placed as to invert and approximate the edges of the wound. The rectal opening may be too high up to accomplish this by merely drawing back the posterior rectal wall, then split the same back to the coccyx and extend the rectal end of the incision four inches up the rectum in order to allow sufficient room to close the rectal opening. Either permanent or repeated catheterization should be continued until the wound in the rectum has united.

When the urine is emptied into the rectum the most important step is to stop or divert its flow. It would be useless to attempt to close the rectal opening when the flow is allowed to dam up against the freshly-closed wound in the rectum, so in these cases, and also in those resulting from a pelvirectal abscess, it is better to make a lateral perineal section above the fistulous tract and thus, by dissecting the latter, the opening into each may now be curetted and sutured from the perineal wound. If a pelvirectal abscess cavity exists, it may also be curetted. In either case it is better not to close the perineal wound, but keep it drained thoroughly and let it close from the bottom by granulation. After suturing the openings from the perineal wound, both urine and fecal matter should be kept from coming in contact with the fistulous openings on the mucous surface of each.

Now, if the fistulous opening is in the sigmoid or small intestine, expose and close the openings by an abdominal sec-

FIG. 74.—RECTO-VAGINAL AND VESICO-VAGI-
NAL FISTULÆ, CAUSED BY THE ACCIDENTAL
REMOVAL OF PORTIONS OF THE BLAD-
DER AND RECTUM IN VAGINAL HYSTEREC-
TOMY. COMPLETE OCCLUSION OF THE
URETERS BY THE SCAR TISSUE AROUND THE
VESICO-VAGINAL OPENING. (⅔ nat-
ural size.)

Autopsy 857. From the sketch in the
upper part of the picture the general relations
are seen. Just posterior to the ureteral ori-
fices is a large opening into the vagina,
through which the vaginal mucosa, V is visi-
ble. Posterior to the vesico-vaginal fistula is a
second opening, R, which communicates with
the rectum. The passage thus formed has ir-
regular and eaten-out margins, and at some
distance from the edge the bladder mucosa
is covered by small diphtheric patches. The
mucosa of the urethra and of the anterior
bladder wall appears normal. The right ure-
ter is considerably twisted, owing to numer-
ous adhesions. It is occluded at its lower
end and rapidly dilates, forming a hydro-
ureter nearly 2 centimetres in diameter. The
pelvis of the kidney is somewhat distended.
The left ureter has been completely obliterated 1.5 centimetre from its exit into the
bladder; above this point it is much dilated.
The walls are much thickened; the lumen was filled with thin pus. The abscesses in the left kidney are not seen in this section —
(Cullen's Cancer of the Uterus.)

tion and, after opening the abdominal cavity, break up adhesions between the bladder and the intestines and then suture the openings separately, turning in the edges of each opening. Where adhesions have been extensive and the peritoneal covering of the intestine destroyed by the inflammatory process for some distance, it is better to resect that portion of the bowel containing the opening, and do an end-to-end anastomosis. The wound in the bladder can be turned in and sutured, as before recommended.

The abdominal wound should be drained by a gauze wick surrounded by protective tissue, down to the point of the fistulous tract.

Recto-ureteral Fistula.—Cases are very rare in which the ureter opens into the rectum, except in malformations, which have already been alluded to. Quite a number of surgeons have transplanted the ureter into the rectum after extirpation of the bladder for malignant disease. As a rule little can be done for the relief of the trouble.

Rectogenital Fistula.—This term applies to a fistulous opening between the rectum and the genital organs. These fistulas may be divided into recto-uterine, rectovulvar, and rectovaginal varieties.

Recto-uterine fistulæ are very rare, and generally due to congenital malformations, although occasionally existing in connection with malignant growths, which have involved both organs and have then broken down. Thomas Cullen has reported one such case in his work on " Carcinoma of the Uterus," page 268 (Fig. 74), and James P. Tuttle another in his work on " Diseases of the Anus, Rectum, and Pelvic Colon," page 446. In the latter cases, if the malignant growth is inoperable (almost invariably the rule), and when so extensive as to bring about this communication between the two canals, nothing can be done. The treatment of those resulting from congenital malformations has already been given.

Rectovulvar Fistula.—Here the fistulous tract extends from the rectum to the vulva, anterior to the hymen, and is generally the result of trauma, or infection with suppuration of the glands of Bartholin. When it originates in the glands of Bartholin, especially from specific infection, it may occur simultaneously on both sides. With both sides affected, if the abscess is not promptly opened and drained it is likely to burrow backward on one side of the perineal raphe and open into the anal canal on the same side, or possibly open into the ischiorectal fossa.

One or more openings may be found and almost certainly two, if both sides are affected simultaneously. If seen before the abscess ruptures the swelling of the labia with the attending pain will indicate the character of the trouble; if seen after the fistulous tract has formed, the discharge of pus from the anus will lead to an examination which will reveal the true state of affairs. There will also be a discharge from the vulva, but as it is so likely to be confounded with a leucorrhœal discharge little attention is paid to it.

The vulvar opening is found in one or both labia, just within the vulva in front of the hymen.

Treatment.—There is always risk of destroying or interfering seriously with the perineal body, so as a rule the open incision as recommended in anorectal fistula had better not be practised here unless for special reasons, but in its stead excision with immediate suture of the fistula. If there should be two tracts they may be excised at different times, or if not attended with too much loss of tissue they may both be done at the same time and through one skin incision. In excising these tracts it is important to secure accurate apposition of the muscular tissue; therefore, in making the incision, as each muscle is cut its ends should be grasped and fixed until the wound is ready to be closed, when the cut ends should be replaced in apposition.

Rectovaginal Fistula.—This consists in an abnormal open-
ing between the rectum and vagina proper and is the most
frequent of all complicated fistulæ. It is due to a variety of
causes: submucous rupture of the rectovaginal septum during
labor; sloughing of the same due to prolonged pressure by
the fetal head, or sloughing from any cause, either of the
rectum or vagina; syphilitic ulceration with or without stric-
ture; carcinoma of rectum or vagina; sharp-pointed foreign
bodies in the rectum; abscesses developing in the septum from
any cause; pelvirectal abscesses, the pus from which may
burrow down and open in both canals; tubercular ulceration
of the rectum is rarely so extensive as to involve the vagina.

SYMPTOMS.—In the majority of cases either the fistulous
tract has formed when the surgeon is called in, or the patient
is under the care of the surgeon for the primary trouble when
the fistula forms. The symptoms are those induced by the
primary trouble. When the fistula has formed, the charac-
teristic symptom is the escape of gas and fecal matter into
the vagina during the act of defecation, and resulting vagini-
tis with leucorrhœa.

The opening being low down in the rectum it can readily
be seen by the aid of a single-bladed speculum, or can be
viewed in a similar manner from the vaginal side, when a
probe can be passed through it.

Even where an examination fails to demonstrate the open-
ing on account of its valve-like character, the passage of gas
through the vagina is sufficient evidence that the false passage
exists.

Treatment.—Cauterization and other local applications,
combined with prolonged constipation and frequent irriga-
tions from the vaginal side, succeed in healing a very limited
number. In a large majority operative measures are neces-
sary, and even these have to be repeated several times in a
certain number of cases.

Doubtless the chief obstacle to be encountered in healing is the liability of reinfection from the rectal side, so let this be the chief point of attack. In order to secure the necessary aseptic conditions, it is better to thoroughly prepare the rectal mucous membrane for twenty-four hours prior to operation, and to combine with this the administration of intestinal antiseptics by the mouth. When the opening into the rectum is high up the difficulties attending its closure are very much enhanced and it may be necessary to make an incision through

FIG. 75.—Lauenstein's operation for recto-vaginal fistula. (Tuttle.)

the posterior commissure, but the conditions do not justify extending this to include a Kraske operation. When the opening is small and low down, it may only be necessary to freshen the rectal opening and close it by sutures, but when large and especially when some distance above the anus, an operation involving the vagina and the perinæum will be necessary.

OPERATION.—The simplest is that advised by Lauenstein (Fig. 75), which consists in denuding the fistulous tract from the vaginal surface down to the rectal mucous mem-

brane; stitches being then introduced from the vaginal side, should include all the tissues of the rectovaginal septum down to the rectal mucous membrane, and the wound is thus closed. The sutures should be of silver wire, and the edges of the wound must be accurately approximated. The opening in the rectal mucous membrane is left open. After the wound is closed the sphincter should be stretched, a rectal tube introduced and the bowels constipated by an opiate.

Various other operations have been devised for closing rectovaginal fistulæ, but that just given meets the demand of any average case, opening low down in the rectum. In more aggravated ones and those opening high up in the rectum, especially if associated with a partial rupture of the perinæum, I advise:

Complete excision of the fistulous tract combined with perineorrhaphy, using the technic suggested by James P. Tuttle in his " Diseases of the Anus, Rectum, and Pelvic Colon," page 453, as follows: The sphincter muscle is thoroughly but gently stretched; the perinæum then completely incised from the vagina into the rectum up to but not including the fistula; a probe is passed through the fistula, and the latter, together with all its cicatricial tissue, dissected out en masse. The mucous membrane of the rectum is trimmed off from the edges of the wound for about half an inch up to the level of the fistulous opening, and above this loosened from its attachments until it can be brought down to the margin of the anus; the perineal septum brought together down to and including the sphincter muscle, with a continuous chromicized cat-gut suture. Three or four deep silver-wire sutures are then passed through the perinæum, after the manner of Emmet. Before the latter are fastened, the mucous flap in the rectum is brought down and sutured to the skin at the margin of the anus (Fig. 76) ; the wire sutures drawn together and made fast by twisting or by perforated shot, and finally the edges of the mucous membrane in the vagina sutured with

plain cat-gut and sealed over with iodoformized collodium. The operation consists in doing practically a Whitehead operation upon the anterior wall of the rectum, combined with a complete perineorrhaphy. The mucous flap closes all communication between the rectum and the perineal wound, and thus protects the latter from fecal and gaseous passages. A

Fig. 76.—Closure of recto-vaginal fistula, showing mucous flap brought outside of rectum and sutured to the skin. (Tuttle.)

small drainage-tube is placed in the rectum to facilitate the escape of gas, and the patient's bowels constipated for six or seven days. After this period injections of oil and glycerin may be given to soften the fecal materials, but under no circumstances, except of real danger to the life of the patient, should a purgative be given until the hard fecal accumulations have been removed or softened. The wire sutures are

removed on the eighth day. In seven cases done by this method not a single failure occurred and I personally have also had excellent success with this method.

The extensive destruction of tissue which attends a certain number of these cases makes it impossible to restore the rectal wall as recommended above without causing a certain amount of stricture of the rectum.

CHAPTER X

HEMORRHOIDS

THE peculiar arrangement of the blood-supply of the rectum, the erect position of man, and the force of habits imposed by civilization combine to make hemorrhoids one of the most frequent of all rectal diseases.

It is among the very earliest ills to which human flesh was heir and of which we have any account. So it may be inferred that when man became sufficiently civilized to record his advancements and achievements, the restricting influences of such civilization brought out this weak point in his anatomic construction.

On account of the prevalent misconception with regard to the structure of hemorrhoids, I begin their consideration with the actual pathological findings, literally defining the actual conditions.

PATHOLOGY.—The following is a record of notes made by William H. Welch in examining a series of microscopical sections, made by myself, at the Pathological Laboratory of the Johns Hopkins University and Hospital, while engaged in a pathological study of hemorrhoids:

> Dilatation of veins.
> Accumulation of leucocytes in veins, especially in periphery: also of blood-plates with the leucocytes.
> Small-cell infiltration in walls of veins.
> Small-cell infiltration in tissue, diffuse, and in foci.
> Plasma cells in tissue.
> The dilatation of veins seems to be mostly on the side of section covered with flat epithelium (integumental side). Here also the connective tissue is denser and of coarser fibres.
> Patches of yellowish-brown pigment indicating old hemorrhages.
> Irregular fibrous thickening of walls of dilated veins.
> Hyaline metamorphosis of venous wall (few nuclei).
> Venous capillaries near epidermis filled with leucocytes (thrombi).

The most extensive dilatation of veins is between epidermis and
smooth muscle (sphincter) ; not in all sections, however.
Connective tissue compressed and atrophied by ectasis of veins;
epidermis thinned.
Arteries in places seem to have hypertrophied muscular coats
and thickened membrana limitans interna.
Also hypertrophy of muscular coat of some veins, but those most
dilated appear to have atrophied walls.
Thick longitudinal bundles of muscles in some veins.
Endarteritis obliterans.—Thrombi composed of fibrin plates and
leucocytes in some of the veins.
It looks sometimes as if the walls of the extensively dilated veins
were thin and atrophied, and those of partly or not dilated
veins were inflamed.
Does inflammation of the venous wall precede the dilatation?
Does hyaline degeneration or coagulation necrosis of venous wall
precede the dilatation?
Calcification in arterial wall.

It will be seen from the above that not only are changes
noted in the walls of the veins and arteries, but also in the
surrounding tissues there are decided changes, such as small-
cell infiltration with dense and coarse connective-tissue fibres
in some places, while in others the connective tissue is com-
pressed and atrophied.

In old hemorrhoidal nodules there may be organization of
the thrombi with new growth of connective tissue between
the vessels so that fibrous nodules or masses of varying con-
sistence remain. These are liable to become the seat of acute
inflammation.

From all of these changes it will be seen that hemorrhoids
are a kind of tumor formation, resembling mostly angioma
or fibro-angioma.

ETIOLOGY.—This is not very definitely determined, not-
withstanding the fact that nearly every disease to which flesh
is heir has been accused of exerting some influence in the pro-
duction of this malady.

COMPLICATIONS.—Besides the reflex conditions of stran-
gury and dysuria, so commonly associated with inflamed hem-
orrhoids, there may be other symptoms and also conditions
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associated with, and even produced by them, in their quiescent state. For instance, I have had cases where the patient has complained of persistent pain in the back, entirely and permanently relieved by removing hemorrhoids, and one in which there was persistent pain in the instep of the right foot, relieved by the same operation.

Still more interesting are two cases of rheumatism permanently relieved by the removal of the ulcerated hemorrhoids. These were reported to me by C. W. McElfresh, of Baltimore. I give only one in full, as the second is practically a duplicate.

CASE 1.—Mr. E. M., age thirty-nine. Family history good; as a child had fairly good health, except all the diseases of childhood. At the age of twenty-three he began to have trouble at stool, protrusion and bleeding after each one. About three months afterward he suffered with rheumatism, was confined to his bed as much as five or six months each year. In 1904. eleven years after his first attack of rheumatism, he was operated on for the relief of his hemorrhoids. He gained nearly twenty pounds in weight in a few months, and has never had any return of his rheumatism since, a period of five years.

McElfresh makes a point of the fact that the hemorrhoids were ulcerated. thus giving a satisfactory explanation for the source of infection causing the rheumatism.

The conditions tending to produce hemorrhoids may be divided into: predisposing and exciting.

Predisposing Causes.—Among the most potent are habits, constitutional conditions, and occupations, those of a sedentary character being more active in its production; age, with greater frequency in middle age, and heredity. the latter indirectly playing a most important part, not that hemorrhoids are directly inherited but a weakened condition of the walls of the blood-vessels, especially the veins, which results in dilatation and varicosities and they, in turn, in tissue changes,

facts borne out by the experience of every one who has paid special attention to the treatment of this malady.

Probably the most pronounced predisposing cause is that due to man's erect posture, which increases the weight of the blood-column in the lower half of the body. The fact also that the blood-vessels of the rectum pass through the muscular walls of the same without being protected from the effects of the muscular fibres in contracting, may be classed as an anatomic cause, and the absence of valves in the portal vessels into which the superior hemorrhoidal vein eventually empties adds materially to such predisposing causes.

Exciting Causes—Constipation.—This is unquestionably the most frequent of all exciting causes, not so much on account of the irritation resulting from hard and dry masses of fecal matter passing through the anal canal as from long-continued pressure by these masses on the walls of the rectal vessels producing stasis in the venous plexuses, and also on account of the great muscular effort necessary to expel these hardened masses. The effect on the local blood-pressure of this unusual effort in defecation is very much accentuated by the peculiar arrangement of the blood-vessels of the rectum—already referred to in their passage through the muscular walls of the same. The muscular coats of the rectum participate in the contraction of the voluntary muscles during this expulsive effort, and in so doing compress the thin walls of the veins very much more than they do the resisting ones of the arteries in their passage through the muscular coat of the rectum. The result is, that arterial blood continues to flow into the parts, while venous blood is shut off almost completely from entering the inferior mesenteric vein on its return to the portal circulation, thus raising the blood-pressure in the superior hemorrhoidal veins enormously, and very materially favoring dilatation of the venous walls. While we occasionally see hemorrhoids unassociated with constipation, even in a minor degree, these are the cases that are due to other causes, especially an inherited weakness of the venous walls.

EFFECT OF CATHARTICS.—Hemorrhoids are frequently the result of too strenuous efforts to overcome constipation by taking active cathartics, especially those containing aloes or podophyllin.

Diet.—As diet has been mentioned before as a causative factor in the production of constipation, the latter in turn may produce hemorrhoids. The continued use of alcohol, by increasing the blood-pressure and disturbing the functions of the intestinal tract, is likely to produce hemorrhoids, or if already existing may be aggravated by even a few drinks a day.

Strain.—Thrombotic hemorrhoids are nearly always the result of straining at stool, which causes rupture of the intima of the vein and this results in the formation of a thrombus.

Hemorrhoids may also be the result of other pathological conditions in the rectum, large intestine, genito-urinary, and uterine organs, as ulcerations, stricture of the rectum or urethra, displacements of the uterus, procidentia, cystitis, prostatitis, and urethritis; also from diseases of the liver, heart, and kidneys, owing to the influence such diseases have on the portal circulation.

Varieties.—From time immemorial hemorrhoids have been divided into external and internal; this classification can still be used with the addition of mixed hemorrhoids, together with their subdivisions.

External Hemorrhoids.—Those located external to the mucocutaneous border-line.

Internal Hemorrhoids.—Those located above and internal mucocutaneous border-line.

Mixed Hemorrhoids.—Those where both the external and internal hemorrhoids exist in the same individual (Fig. 77).

Subdivisions.—A still further subdivision is as follows: External hemorrhoids may be divided into thrombotic, varicose, and connective-tissue hemorrhoids.

THROMBOTIC.—These are oval tumors, purplish in color, the skin surface over the tumor a little or not at all inflamed;

and varying in size from a buck-shot to a walnut (Fig. 78).
They generally appear suddenly after straining at stool, or
after very prolonged exercise, and are due to the rupture of
the intima of the vein and the formation of a thrombus. They
may be single or multiple, and attended with considerable pain,
due to distention and pressure, and varying with the extent of
the same. The clot may be absorbed if not very large; or it
may become organized, rarely calcified, or infected, break
down, and form an abscess. This infection generally takes

FIG. 77.—Mixed hemorrhoids.

place through hair follicles, or sebaceous glands, on account of
its close proximity to the surface.

Treatment.—If the clot is small and does not give rise to
much annoyance it may be left undisturbed, with some general
directions for the patient to keep quiet and to have easy
evacuations. Should there be pain, let it be incised under
local anæsthesia, the clot turned out and the little cavity gently
packed for twenty-four hours (these cavities, however, should
not be closed by immediate suture, as the pain that follows

will be out of proportion to the benefits derived) ; after which it may be treated with antiseptic ointments and encouraged to heal as rapidly as possible. The bowels should be kept open.

Should more than one hemorrhoid exist, or one in connection with hypertrophied tags, remove all at the same time.

VARICOSE EXTERNAL HEMORRHOIDS.—These mean a varicose condition of the systemic veins surrounding the margin

FIG. 78.—Thrombotic hemorrhoid with inflamed anal margin.

of the anus, a condition not apparent until the patient is made to bear down and strain, when the dilated vessels become distended with blood, showing very plainly as tortuous varicosities, or by a general swelling of the parts surrounding the anal margin. It is a very common condition in persons who are subject to chronic constipation.

There may be very little increase in the connective tissue in this form of hemorrhoids, unless they have continued for a

long time, or have been subject to acute attacks of inflammation. These develop, as a rule, very slowly, are not attended with any pain, nor do they interfere with the action of the bowels. The swelling attending them from distention is uniform and not lobulated. It is this form of hemorrhoids that are peculiarly liable to the formation of small multiple thrombi, which are the principal cause of the inflammatory attacks to which they are subject.

Treatment.—Little can be accomplished in the treatment of these hemorrhoids except operative measures, nor need the latter be undertaken, unless inflammation, the result of multiple thrombi, sets in. Until this occurs some general directions with regard to the regularity of fecal movements, not sitting long at stool, avoiding long standing, and stretching the sphincter when spasmodically contracted, are about all that can be done to palliate this trouble.

Operation.—When it becomes necessary to operate on this form, if not associated with internal hemorrhoids (which, however, is very rare), take out two or three transverse elliptical pieces of skin on each side of the rectum, with its subjacent tissue and varicose vessels, and dissect out the varicose vessels from under the remaining flaps. Take care not to let the incision extend beyond the mucocutaneous line. Wash the wound off with a solution of 1 to 1000 bichloride of mercury, and apply a compress of sterile gauze tightly to the perinæum. These should be renewed several times daily and the bowels should be confined for three or four days.

CONNECTIVE-TISSUE HEMORRHOIDS.—These may result from an acutely inflamed hemorrhoid after the inflammation and swelling have subsided, during which time hypertrophy of the connective tissue and of the skin takes place, or from some chronic inflammation around the anal margin. They are composed of hypertrophied skin, connective and mucocutaneous tissue around the anal margin. When not inflamed, they appear as thin folds of redundant skin and do little if any

harm, except interfering with cleanliness; they are easily irritated and inflamed, and then give rise to pain and discomfort.

While existing sometimes entirely independent of any rectal trouble within, yet they are frequently associated with stricture of the rectum and specific ulceration of the same, in fact, any chronic irritating discharge from the rectum may give rise to them. They may be single, or multiple; thin, or thick; pedunculated, or broad at their base.

Treatment.—Unless inflamed, or associated with pruritus ani, they should not be disturbed, but when they are, they should be snipped off with scissors; especially should this be done when there is any suspicion of their being the exciting cause of pruritus ani. Do this under cocain anæsthesia, and the bleeding can be controlled by pressure.

Internal Hemorrhoids.—These may be divided into capillary, varicose, and thrombotic hemorrhoids; merely successive stages of a complete internal hemorrhoidal tumor.

Capillary Hemorrhoids.—This variety consists of dilatation of the capillaries in the mucous membrane just above the sphincter, yet showing very little increase in the connective-tissue elements. It is the first stage in the development of internal hemorrhoids, and if allowed to continue they will almost certainly develop into the varicose variety, with the usual increase of connective tissue.

Symptoms.—Bleeding; sometimes very profuse and always easily excited. Upon examination there will be found a raspberry-like tumor just above the internal sphincter; it will generally be necessary to use the single-bladed speculum in order to get a view of it, unless the sphincter is very much relaxed.

Varicose Internal Hemorrhoids.—In addition to the above conditions there is a much greater dilatation of the veins, with an increase in the interstitial tissue and the formation of a true hemorrhoidal tumor.

THROMBOTIC INTERNAL HEMORRHOIDS.—This is the condition existing in varicose hemorrhoids, plus the formation of thrombi in the vessels. The symptoms in both of these latter varieties are: a decided tumor formation with or without bleeding, which as a rule is only occasional, and only sometimes excessive; the former is not likely to be painful, unless acutely inflamed; the latter is very painful, because the formation of thrombi is attended with and followed by inflammatory symptoms. These tumors may or may not protrude from the anal margin; as a rule, they only protrude at the time of having a stool; but when they become inflamed and swollen, or after having existed in a quiescent state for a long time and the sphincter becomes relaxed, they are likely to protrude upon the slightest provocation. After they have protruded for some little time, the mucous surfaces become eroded and denuded of their epithelial covering. They are globular in shape, seldom pedunculated, end abruptly at the white line of Hilton, unless associated with external hemorrhoids, and even when they are this line marks the division between the two. When multiple, there is nearly always a longitudinal line of division between the two, corresponding with the sulci between the columns of Morgagni. This is one of the distinguishing features between internal hemorrhoids and prolapse of the rectum.

Mixed Hemorrhoids.—Either of the varieties of external or internal hemorrhoids may coexist in the same individual, and the white line of Hilton is the dividing line between the two. It is at this line that the connective tissue is denser, the mucous membrane more closely adherent to the muscular walls, and the vascular supply most limited; therefore, it is very seldom that any hemorrhoids ever involve this line, and then only when internal hemorrhoids have existed for some time and by their pressure downward have gradually raised the mucous membrane and distended the connective tissue. It is when the hemorrhoids have passed this line that free anas-

tomosis is established between the superior and inferior hemorrhoidal veins, or between the portal and systemic vessels.

These hemorrhoids are covered by both mucous and muco-cutaneous tissue, and are as previously described complete hemorrhoidal tumors, of both the external and internal varieties.

Any of the varieties of internal hemorrhoids (or where the internal exist in connection with external, as in mixed hemorrhoids) may become strangulated, either by the prolapsed mass being grasped by a spasmodic sphincter, or by the circulation in the internal hemorrhoids being interfered with and blocked by inflammatory processes. In either case the hemorrhoids become very much swollen and enlarged in consequence of this obstruction to their circulation, and will not return above the sphincter of themselves, nor are they easily replaced.

If the strangulation has not existed for any length of time, and the patient refuses to be operated upon, they may be returned into the rectum; first, by placing the patient in the knee-chest position, so that the hips may be well elevated, or better still, in " the Mathews-Haines position "; then, anointing the hemorrhoids well with vaselin, the surgeon may by steady but gentle pressure with the four fingers return them. If he fails to do so by this means, then a general anæsthetic may be administered, when they can be readily returned.

If the patient agrees to an operation, deal with these as with other internal hemorrhoids, regardless of their strangulated condition, unless they have become gangrenous, in which case they had better be excised, the bleeding vessels controlled by buried ligatures, and the wound left to heal by granulation. Take special care during the process of healing to prevent a secondary hemorrhage, by keeping the patient perfectly quiet and in a recumbent position for six or eight days, or until the wound presents a perfectly healthy, granulating appearance. As soon as the hemorrhoids are excised and the bleeding con-

trolled the fresh surfaces should be cauterized, either with a hot iron or pure carbolic acid, to prevent infection from the septic conditions. Under no condition should the gangrenous mass be left to slough away.

If inflamed conditions exist and the patient declines operation, the internal hemorrhoids should be returned and ice applied to the parts. The following ointment may be introduced into the rectum by a pile-pipe (Fig. 79), or a collapsible metallic tube with a nozzle (Fig. 80):

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℞—Pulv. opii ........................ gr. x
   Ext. hyoscyamus ................ gr. xii
   Ext. hamamelis virg. ............ ℨii
   Vaselin .......................... q.s. ℥i
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FIG. 79.—Pile ointment pipe.
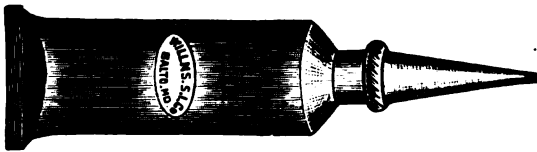
FIG. 80.—Collapsible metallic tube.

The above quantity of ointment should serve for about twelve applications, making an application every three or four hours.

The use of alcoholic drinks should be interdicted.

TREATMENT OF INTERNAL HEMORRHOIDS.—*Palliative Treatment.*—When these are not inflamed, much can be done to relieve the annoyance by regulating the evacuations; avoiding excessive action; securing the proper consistency of stools; replacing the tumors immediately after stool, after which the patient should lie down for half an hour; and if there is bleeding it should be controlled by styptics. Where there is

considerable irritability, with spasmodic contraction of the sphincter, much relief will be afforded by dilating the sphincter, which can be done satisfactorily, under local anæsthesia, as before advised.

Operative Treatment.—There have been numerous operative procedures suggested and practised for the removal of hemorrhoids, but I refer only to those in general use at the present time, and include the injection method and electrolysis, although strictly speaking they cannot be classified as operations.

Injection Method.—Here is the technic of Collier F. Martin, of Philadelphia, Penna., probably one of its most ardent advocates in this country, and who with his father,
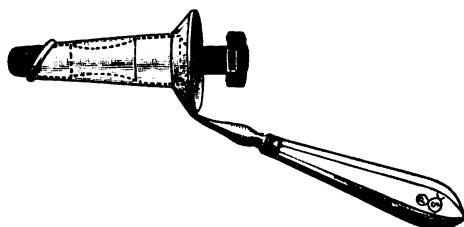
Fig. 81.—Collier F. Martin's Conical Speculum.

Dr. Robert W. Martin, has practised it since 1876; the latter worked out their present technic in a most careful and judicious manner, as seen by referring to some unpublished notes by him contained in a paper written by his son, Dr. Collier F. Martin, and published in *American Medicine,* Vol. viii, No. 9, pages 365–370, August 27, 1904.

Their first recommendation is to dilate the sphincter thoroughly under nitrous oxide gas, for the purpose of overcoming sphincterismus or sphincteralgia, which they think has been the cause of many of the complications that follow the use of this method. This is to be done four or five days prior to beginning the injections of the hemorrhoids. They recommend the use of a small conical speculum (Fig. 81), with the distal end cut off at an angle of forty-five degrees,

the edge of which is protected by a small wire bead running completely around it; the angle at which the distal end is cut allows the hemorrhoids on that side of the instrument to protrude into the mouth of the speculum, and by rotating the speculum the hemorrhoids in every segment can thus be made to protrude into its mouth. Each hemorrhoid is to be injected separately, and at intervals of from five to seven days, the surface of the hemorrhoid having been first carefully swabbed off with some mild antiseptic solution, such as creolin 1 per cent.; the injection should be made directly into the most prominent portion of the pile, very slowly, drop by drop, watching carefully the change of color. When the whole or a larger part of the visible surface of the pile has assumed a whitish color, the hypodermic needle should be withdrawn carefully, and as the point of the needle reaches the point of exit an additional drop of the fluid is forced out of the syringe to seal the opening. The speculum is then withdrawn, before removing the needle, allowing the rectal walls to collapse, which prevents the hemorrhoid from protruding after it has been injected. They recommend for the injection a solution of equal parts of phenol bobœuf and distilled water, freshly prepared and filtered, the fluid to be discarded if it becomes opaque. Ordinary cases require an injection from 7 m. to 15 m. After the injection, they recommend the introduction of a suppository containing ½ gr. cocain to prevent the slight discomfort which may be felt for the first hour, and also a suppository containing 3 m. of ichthyol, and the latter suppositories are to be used during the entire course of treatment, one at bed-time and one after the bowels are moved. The bowels are to be moved daily.

Character of Hemorrhoids to be Injected.—Quoting Martin further: " It might seem unnecessary to describe the forms of hemorrhoids suited to the injection treatment, but I have been asked so frequently if I inject external hemorrhoids that I wish my views to be thoroughly understood. Under no circumstances do I inject external hemorrhoids, nor any

structures covered by true skin. Internal hemorrhoids, and cases in which there is a prolapse of the mucous membrane only, are treated by this method. External hemorrhoids and hypertrophied anal folds are so readily and painlessly removed under local anæsthesia, while the injection of these structures causes so much irritation, besides the danger of infection, that I do not believe we are justified in employing the latter treatment in these cases. When an internal hemorrhoid, from long-continued irritation and inflammation, has become excessively hypertrophied and fibrous, I feel that the wisest course to pursue would be to anæsthetize the tumor and remove it with
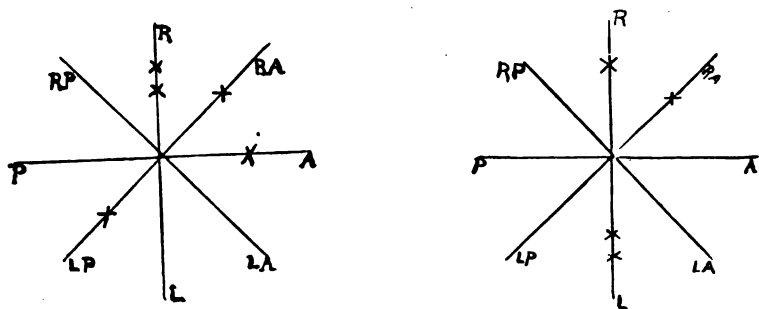
Fig. 82.—A diagrammatic sketch to show where the injections have been made.

a clamp and cautery or by ligature. Many piles of this variety can be absorbed by the injection, but the process is long and tedious and may result in failure."

" It is rather important to keep a systematic record of the hemorrhoids treated, both for convenience during the course of visits, and also in case of a return of the condition, to know if the recurrence has been *in situ*, or in some other segment of the bowel. For convenience the mucosa is divided into eight segments, as shown in the sketch above, and the injections may be designated by the initials A, P, R, L, or Ar, Al, Pr, or PL. Also a note may be made of the amount of fluid employed. In the sketch the crosses (X) show where the injections have been made " (Fig. 82). (From C. Martin's Paper, page 13.)

"The only complication I have ever encountered has been the production of a small slough, associated with a sense of discomfort and fulness in the rectum. No noticeable pain follows, unless the sphincter has not been thoroughly divulsed, and the slough heals readily after a couple of applications of the stick silver nitrate."

"The injections should be continued until all the hemorrhoids have been absorbed and the rectal mucosa does not prolapse into the speculum to any extent when the patient coughs hard. The fact that the patient is comfortable, and that the piles do not come down at stool, does not indicate a cure, for if any hemorrhoidal tissue remain the percentage of recurrences will be materially increased. Under careful treatment I would estimate the recurrences at about 15 per cent., these usually occurring after an interval of from three to five years. If the recurrence does not take place and the primary divulsion has been thoroughly performed, a second divulsion is rarely necessary, and the patient can usually be permanently relieved by a few additional injections."

"The causes of sloughing following the injection are practically fourfold: 1. Spasm of sphincters interfering with the circulation; 2. Superficial injections causing destruction of the mucous membrane; 3. Strong solutions causing a blocking of the circulation with destruction of tissue; 4. Too large injections causing excessive irritation with pressure necrosis.

"There is no doubt that the sloughs usually formed are sterile, but after separation begins it is perfectly possible for the granulation surface below to become infected from the fæces, or rectal discharges. For this reason sloughs in the rectum, however produced, are to be avoided, and the fewer formed the less the likelihood of serious consequences following treatment. In my own practice, I doubt if sloughs ever occur in over 3 per cent. of cases, and when they do occur they are watched carefully until there is no danger of infection."

" In connection with the injection treatment, the operation of divulsion of the sphincter seems to deserve some special mention. There are two methods to consider, one a gradual dilation with sounds and dilators, and the other a rapid divulsion under anæsthesia, employing either the fingers or the mechanical dilators. Gradual dilation in my hands gave very imperfect results, and the effect of the process was not lasting. Often the procedure, instead of relaxing the muscles, seemed to add to their irritability, by reason of the exercise given them, so that I have discontinued the practise. Rapid or forcible dilation or divulsion of the sphincters presents two distinct types of technic for study. In the first, the operation is performed in a few seconds under the influence of the anæsthetic, in which the reflex action of the sphincters is preserved, or even accentuated, as with nitrous oxid or ethyl chlorid; in the second, the procedure involves careful stretching and massage of the muscles while relaxed from full anæsthesia, produced by means of ether or chloroform. This second variety is that usually performed by the general surgeon, and has been fully described in text-books treating of this subject."

" The administration of nitrous oxid is admirably adapted to the short operation of rapid divulsion. Under its influence, the sphincteric reflexes are retained, and even accentuated, this contraction offering a good index as to the amount of force to be used in the operation. After the patient is anæsthetized, the muscle is stretched manually, until the fibres just begin to give away under the fingers. It is unsafe to continue beyond this point, as it is undesirable to lacerate the muscle fibres. As soon as the patient recovers consciousness, a hot compress should be applied firmly to the anus for about five minutes. The patient may then be allowed to go home, being instructed to use the compresses every three hours, if he has much soreness from the traumatism. He may return to work the next day. At the end of four or five days, after the muscle has recovered from the bruising, the treatment by injection may be commenced. Hemorrhoids which were before inflamed,

ulcerated, or bleeding have from the improvement in the vascular condition of the muscle been converted into simple internal hemorrhoids. Bleeding from hemorrhoids rarely persists after divulsion, a feature greatly appreciated by the patient."

" The length of time necessary to complete a cure varies with the number of hemorrhoids present, and the length of time they have existed. Ordinary cases require from three to twelve treatments, and although some require more, yet the result is always positive if the treatment is followed out conscientiously. I have treated now about three hundred and fifty patients by this method, with nothing but good results, and I see no reason, from what I have seen of the results obtained by my father in over four thousand cases, to expect anything but satisfaction from the employment of this method."

My own experience with the injection of hemorrhoids has not been at all satisfactory, although I have tried most of the improved methods, except that of Dr. Martin, and such has been the experience of many others.

ELECTROLYSIS.—This method has been recommended by Dr. Ball and quite a number of others. After a careful and thorough trial of this method some years ago, I discarded it; having found it unsatisfactory and inefficient. It would control the bleeding, but not destroy the tumors sufficiently to prevent a recurrence in a short time. The first effect of the treatment on the hemorrhoidal tumor would be to produce coagulation of the blood in the tumor, which would either break down and form a slough or subsequently become organized and cause some shrinking of the tumor.

TREATMENT OF CAPILLARY HEMORRHOIDS.—While these tumors bleed very readily and freely from their surface, yet when they are cut off there is very little danger from excessive loss of blood from this cause. It is better, however, to use some means for controlling the bleeding when they are removed, which can best be done by the use of the angiotribe (Fig. 83) devised (by Downs & Co.) which controls the bleed-

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ing and at the same time destroys the tumor; or a ligature may be thrown around it and tied, and the tumor cut off. Either of these means may be used without a local anæsthetic. The only objection to the angiotribe is the difficulty of protecting the anal margin from the painful effect of the heat, even though a protecting shield is used (Fig. 84).

TREATMENT OF VARICOSE AND THROMBOTIC HEMOR-RHOIDS.—*Preparation of the Patient.*—Let the bowels be thoroughly emptied, ten or twelve hours prior to the opera-
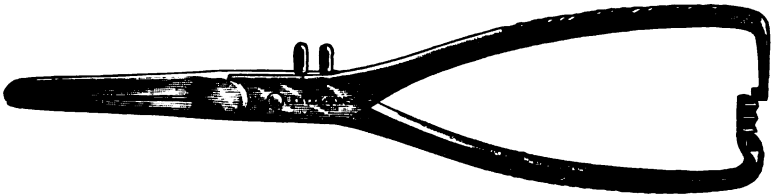
FIG. 83.—Small electro-thermic angiotribe.
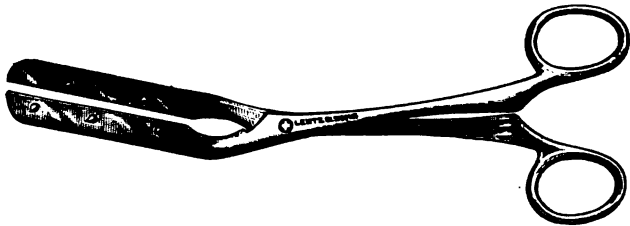
FIG. 84.—Protecting shield to be used with the angiotribe.

tion and about two hours beforehand well washed out with several enemas of tepid water; the toilet for the operation should be made immediately before operation, and consists of a thorough washing out of the rectum with soap and water, shaving and washing the external parts, and finally irrigating them with 1–1000 solution of bichloride of mercury; the rectum then should be packed with sterile gauze to prevent fecal matter from coming down from above and soiling the field of operation. Probably the best position is the exaggerated lithotomy one, with the hips well elevated and the legs held over the abdomen by the shoulder-straps.

The Anæsthetic.—It is now generally conceded that almost any case of hemorrhoids can be operated upon satisfactorily by local anæsthesia, the technic of which has been already given. There may, however, be reasons or conditions why the operator should prefer a general anæsthetic. Personally, I prefer it in all cases except single hemorrhoids, or where there is some special objection.

Dilate the sphincter thoroughly before beginning to operate, either by the fingers or with the thumbs in the rectum and the fingers external to the tuberosities, using the same for a fulcrum; Kelly's conical dilator is much better. With care in the use of this instrument, the muscle can be thoroughly dilated without much risk of tearing it, and altogether it is very satisfactory.

The Ligature Operation.—This has been in use for many years, though more generally in England than in our country, Allingham having done much to popularize it there. In America J. McDowell Mathews, of Louisville, Kentucky, has been a very ardent advocate of it.

It consists in first pulling the hemorrhoids well down with catch, or T forceps, then with a pair of scissors the incision is begun at the base of the tumor on the skin surface, and is continued up under the tumor until it reaches its upper limit, when the artery is felt for in the pedicle, and is held until the pedicle is trimmed down close to it. A strong silk ligature is then thrown around the pedicle and tied tightly. I prefer transfixing the pedicle with a double ligature and tying it on each side (Fig. 85). The hemorrhoid is then excised close to the ligature, each hemorrhoid being removed in a similar manner. If any skin-tags exist they are cut off flush with the surface of the skin and the bleeding controlled by compression. The wound is then dressed with sterile gauze, wrung out in a solution of bichloride of mercury 1 to 1000.

The results are most satisfactory and the death rate extremely low.

After-Treatment.—To avoid repetition, the after-treatment following the ligature operation is similar to that following other operations for excising hemorrhoids. Therefore what I state here will answer for them all. Pain should be controlled at first by hypodermics of morphia, subsequently by codein one-half of a grain, and acetanilid gr. 3, guarded by caffeine citrate gr. 1. The morphia will control the bowels until the fourth day, when they should be moved by compound licorice powder, or castor oil, followed by a warm enema when the first impulse for an evacuation begins.

Fig. 85.—Transfixing a hemorrhoid with a needle threaded with a double ligature.

The diet to be of a laxative character, such as fruits and vegetables, and in order to still further insure a soft stool give three half-ounce doses of olive oil on the third day.

Dressings.—Remember, in the after-treatment of rectal wounds of all kinds there is a different condition to meet than elsewhere on the surface of the body, and worse than at other orifices, on account of the infected character of the discharges, even though they only consist of mucus. These are continuously and unavoidably coming down over the wound and

infecting it. Control the growth of the organisms that are on the wound by frequent irrigations with antiseptic solutions and frequent changes of dressings. On the third day the patient may be allowed to be about his room, and on the seventh to leave the hospital.

Method by Clamp and Cautery.—This method, originating with Cusack of Dublin in 1864, was introduced into London by Mr. Henry Lee, and brought prominently before the medical profession of England by Henry Smith in 1864. It still holds its own and has many advocates in spite of the fact that it seems to be an antiquated method in the light of the advance in antiseptic surgery. While it was unquestionably a great boon to rectal surgery at the time, and for many years following, when methods for controlling hemorrhage were very meagre and we had no knowledge of antiseptic surgery, I fail to see now any good reason for continuing it under present conditions, when tumors in every other portion of the body and under nearly every condition are dealt with by modern methods, namely, excision with immediate suture. There is no question about the superiority of the latter over the clamp and cautery for neatness and accuracy in removing just what is necessary, for the perfect control it gives over hemorrhage, and in ultimate results; and these advantages are still further emphasized by the fact that they can be done under local anæsthesia.

The following is the technic for the clamp-and-cautery operation: The patient having been previously prepared and anæsthetized, is placed in the lithotomy position, with the limbs well flexed and held in position by shoulder-straps, or a Clover crutch. The sphincter is thoroughly dilated and the hemorrhoids exposed by everting the anus.

Each tumor is caught with Tuttle's hemorrhoidal forceps (Fig. 86), in a line parallel with the long axis of the bowel, and drawn well down. If only an internal hemorrhoid, it is clamped at its base, parallel with the long axis of the

bowel, the screw of the clamp being tightened sufficiently to hold the stump firmly without danger of slipping. If the hemorrhoid is not too thick it should be excised with the Paquelin cautery-knife, heated to a dull red heat. If very fleshy, it may be excised with scissors, a quarter of an inch above the surface of the clamp. The stump should then be thoroughly cauterized with the cautery-point at a dull red heat.

In a case of mixed hemorrhoids, excise the base of the external portion of the hemorrhoid with scissors to a point above the mucocutaneous border, after which apply the clamp to the internal portion of the hemorrhoid, screw it down, and remove the portion of the hemorrhoid above the clamp, either
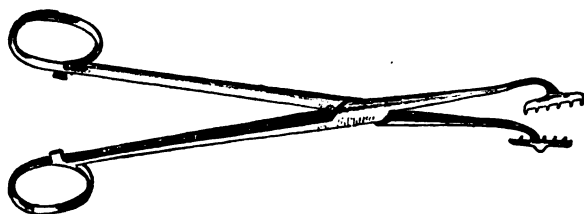
FIG. 86.—Tuttle's hemorrhoidal forceps. (Tuttle.)

by scissors and then cauterize the stump, or by the cautery knife as previously described. Remove each hemorrhoid in a similar manner, taking care to leave a strip of skin and mucous membrane intact between the two, also that no portion of the skin surface of any hemorrhoids be cauterized. Excise skin-tags or redundant portions of skin that remain with scissors at the level of the skin surface.

Subsequent Treatment.—James P. Tuttle suggests cauterized stumps being freely dusted with bicarbonate of soda to allay the burning occasioned by the cautery. The stumps are now returned, if they have not already done so spontaneously, and a compress applied which is held in position by a tightly-fitting T bandage. A hypodermic of morphia gr. $\frac{1}{4}$ is given, which may be repeated every two or three hours if the patient is in pain.

If it is necessary to sponge off the stumps of the hemor-
rhoids, it should be done by direct pressure with a sponge,
and not wiped from side to side, for fear of separating the
cauterized surfaces.

I do not recommend the introduction of tubes or packing,
after operation, as they increase the pain, especially when
being removed.

Have the bowels moved on the third day with some gentle
laxative, and every day thereafter by warm enemas, and wash
off the wound with a weak solution of bichloride of mercury
twice daily, dusting with antiseptic powder N. F.

The patient may be allowed to get out of bed on the third
day after the bowels have been moved, and generally allowed
to leave the hospital on the seventh day, but the wound should
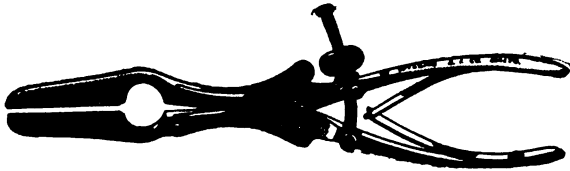
Fig. 87.—Linthicum's hemorrhoidal clamp.

be looked after every alternate day, and treated by stimulating
applications until it is entirely healed, which requires from two
to four weeks. The finger should be introduced into the bowel
on the seventh day, to ascertain if there is any constriction,
and this should be repeated every third or fourth day while
the patient is under observation.

Clamps.—Of the clamps now in use for this operation I
would recommend those devised by G. Milton Linthicum, of
Baltimore, Maryland (*Philadelphia Med. Journal,* June 22,
1901. Fig. 87), also that devised by Dwight H. Murray, of
Syracuse, New York (*Philadelphia Med. Journal,* Sept. 28,
1908. Fig. 88). These clamps, almost identical in construc-
tion, were devised and used by their originators some time
before publication, and each without knowing the other had

constructed a similar instrument. The blades of these clamps maintain a parallel position throughout the limit of their movements; the hold on the tissues is firm, the thumb-screw easily adjusted even by the thumb of the hand holding the blade. The handles are sufficiently far apart, even when closed, for a firm hold to be maintained, and the instrument is so constructed that it may be disjointed for cleaning and sterilizing.

The thermocautery is decidedly to be preferred to the electric one, because the amount of heat in the former is so much more easily regulated, nor is it so intense.

But as a substitute for the clamp and cautery I would recommend the angiotribe, it being far safer and just as effectual. With the usual general directions in using the
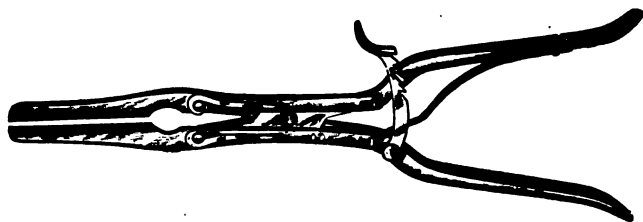
Fig. 88.—Murray's hemorrhoidal clamp.

former, namely, that it should only be used for removing internal hemorrhoids, the angiotribe is to be applied with the long axis of the rectum, and when there are mixed hemorrhoids, the mucocutaneous base should first be cut through with scissors, and the angiotribe applied to the internal portions.

J. Rawson Pennington, of Chicago, Illinois, is very partial to what he terms " A simple operation for hemorrhoids "—enucleation.

" The patient is placed in the lithotomy position and the limbs held over the abdomen by means of the Clover crutch. The usual toilet for the preparation of the patient, as before given, having been completed, each anal quadrant is grasped at the mucocutaneous junction with a pair of T forceps. These

are held by an assistant. By means of these instruments the anus is everted and the internal tumors are exposed. Now seizing with the full hand the forceps attached to the posterior quadrant, the hemorrhoid is fully everted, and with a pair of scissors curved on the flat side the redundant tissue only is cut off, usually about one-third or one-half of the uppermost part of the hemorrhoidal node. This permits most of the blood in the tumor to escape. All of the angiomatous tissue is carefully removed, when the remaining wall collapses. This leaves a very small area, if any, of denuded surface. Each quadrant in regular order is treated in a similar manner. A stream of hot sterilized water flows over the field continually during the operation. Spurting vessels, if any, are caught with a pair of forceps and thoroughly twisted. Should this fail to control the hemorrhage I would throw a ligature around the vessel and ligate it. So far I have not found this necessary. The T forceps are then removed and all external tumors and tags of skin cut off with a pair of straight scissors, care being taken not to make an incision in the mucocutaneous junction, when it can be avoided, as this is the most sensitive point around the anus. The same precaution should also be observed when removing the internal tumors. The field is then dusted with nosophene powder and a rubber-covered hollow tampon introduced through a bivalve speculum. Over this is placed gauze, and a T bandage. Care should be taken that the T bandage is made quite taut. The patient is then placed in bed.

" By operating in this manner there are no tender and obstructive stumps to slough, nor nerves caught and squeezed (which produces most excruciating pain), as there are when the ligature method is used; nor are the nerves and tissues burned to a crisp, which is also painful, as when the clamp and cautery is employed. In lieu of this, a fibrinous exudate is deposited over the operated field, which exudate is neither destroyed nor disturbed upon the removal of the dressings.

Moreover, the danger of stricture is obviated, as the normal calibre of the bowel is left practically covered with mucous membrane. Neither is the anal orifice contracted, as it necessarily is after either of the above operations.

" At the end of forty-eight hours the patient is given a cathartic and the tampon removed. Removing it is easy and painless. The movement of the bowels is also painless, and there is, as a rule, little or no bleeding."

" From this time on until convalescence is well established the parts should be washed or irrigated twice a day with an antiseptic solution, and dusted with some powder, as iodoform, boracic acid, or nosophene. I have used the latter drug almost exclusively for the past eighteen months and prefer it to either of the others. After the bowels have been moved the patient is instructed to keep them soft for two or three weeks."

Excision with Immediate Suture.—This method, in some one of the many forms devised within the last few years, appeals strongly to the average surgeon of the present day as being most rational and in keeping with the methods used in other parts of the body for removing tumors.

Whitehead's Method.—Mr. Walter Whitehead, of Manchester, England, was probably the first to pursue this method (1882), after an unsatisfactory experience with the ligature, clamp and cautery.

After the usual toilet, as before described, and with the patient under the influence of a general anæsthetic, also the sphincter having been thoroughly dilated, so that the hemorrhoids and any redundant mucous membrane may project from the anal orifice without any difficulty, the mucous membrane is divided at its juncture with the skin around the entire circumference of the anal margin, every irregularity of the skin being carefully followed.

The external sphincter together with the lower portion of the internal sphincter are then exposed by rapid dissection,

with the blunt end of curved scissors, and the mucous membrane and the attached hemorrhoids, separated from the submucous layer, are pulled down and brought below the margin of the skin.

The mucous membrane above the hemorrhoids is now divided transversely in successive stages, and the free margin of the severed membrane is attached, as soon as divided, to the free margin of the skin below, by the necessary number of sutures, to keep the cut surfaces in apposition. This excision of the pile-bearing mucous membrane is continued around the entire anal margin and bleeding vessels throughout the operation are twisted when divided.

Mr. Whitehead is very careful that no skin be sacrificed, however redundant, and says: " The little tags of superfluous skin soon contract and eventually cause no further inconvenience." He states that there is practically no hemorrhage during the dissection, but such has not been my experience, nor that of any surgeon whom I have seen operate by this method. In the three hundred cases that Mr. Whitehead reported, he did not have a single case of secondary hemorrhage. Before closing the wound, he dusts the raw surfaces with iodoform, for the purpose of controlling the oozing. He uses carbolized silk sutures, and never takes out the stitches. An ice-bag is kept on the rectum for the first few days, and the bowels are moved on the fourth day. The patient sits up on the same day, and is allowed to resume his work in two weeks. The amount of pain varies with the sensibility of the patient, but as a rule it is considerable, and requires the use of morphia. He states that the time required for the operation is short.

Mr. Whitehead's experience with this method has not been borne out by other operators; their objections being the amount of blood lost; the length of time required; the uncertainty of primary union; the danger of stricture, and the probable incontinence that is likely to follow on account of

the necessary removal of certain anatomic structures, especially the tactile or sensitive margin of the anus, with its papilla.

While such a result may follow operations with the ligature, clamp, and cautery, it is not nearly so likely as in Whitehead's operation, and the danger of subsequent contraction at the anal orifice is much greater in the latter.

I have devised a modification of Whitehead's operation, which does away with most of the objections urged against the latter, for, instead of excising all of the pile-bearing membrane as suggested in Whitehead's operation, many surgeons prefer to excise the individual pile-tumors and close the wound with cat-gut sutures. Gallant (*Mathews Medical Quarterly,* October, 1894), states that Outerbridge had followed this plan since 1888 with great success. This suggestion appealed to me very strongly, especially as I was casting about for some more satisfactory method for operating than that recommended by Dr. Whitehead, or the clamp and cautery, neither of which had proved satisfactory, after a most careful and prolonged use of each.

After having followed Outerbridge's suggestion for some time, I found it necessary to devise some means to prevent the opposite walls of the adjacent hemorrhoids from being included in the sutures of the wound that was being closed; in other words, some means of keeping the hemorrhoid that is being treated distinctly separate from its neighbors. This was accomplished by devising the pile-forceps (Fig. 89). These are seen to have conical-shaped blades, over which the suture will slip very readily; they have serrated edges and are purposely not made sufficiently strong to bruise the tissues which they clamp.

Similar suggestions seem to have occurred to others, about the same time, independent of each other.

In order to authenticate distinction of priority, I give the dates on which each method was first published.

Earle (*Mathews Medical Quarterly,* January, 1896), and Parkhill (*International Journal of Surgery,* May, 1900). Both of these have devised instruments for holding individual hemorrhoids while being excised and sutured, also to facilitate the Whitehead method, and to overcome its objections.

All of these methods are very similar, but as Earle's preceded all others, I give only that.

Earle's Method.—With the patient prepared for operation in the usual manner, the sphincter is stretched and the parts thoroughly cleansed. When the hemorrhoidal tumor is single, whether internal or mixed, it should be caught with the ordi-
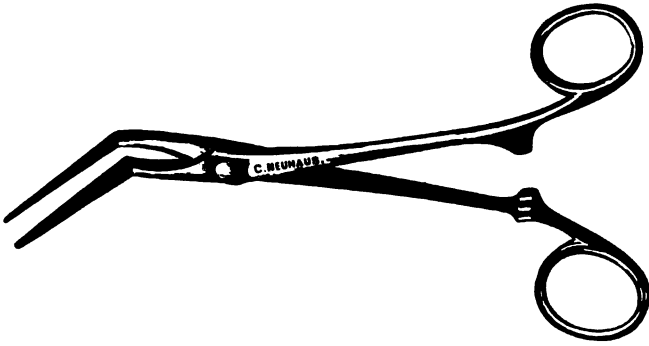
FIG. 89.—Earle's straight hemorrhoidal forceps.

nary catch or T forceps and dragged well down and out of the anal canal. It is then clamped at its base, in the line of the long axis of the rectum, by the Earle hemorrhoidal clamp; a suture of cat-gut is placed at the uppermost border of the hemorrhoid, directly beneath the toe of the clamp. After the suture is tied firmly the portion of the pile above the clamp is cut off, a small portion at a time, followed by a running suture that is passed beneath and then carried over the top of the clamp; these two steps in the operation are continued alternately, until the whole of the pile within the grasp of the clamp has been excised, and its stump sutured. The suture is not drawn tightly around the clamp, so the latter may be loosened and slipped out readily; this is done, after which

the suture is drawn tight, thus completely closing the wound; the suture is tied at its distal end with a running knot. Each hemorrhoid is treated similarly in turn, until all are removed; care being taken to leave a strip of skin and mucous membrane between each of those that are removed.

The operation can be done very satisfactorily under local anæsthesia, using ½ of 1 per cent. solution of cocain for the first two injections, one at each commissure, and ¼ of 1 per cent. solution for injecting each of the hemorrhoids, when each is ready to be excised.

The whole circumference of the anal margin is perhaps surrounded by mixed hemorrhoids which coalesce and cannot
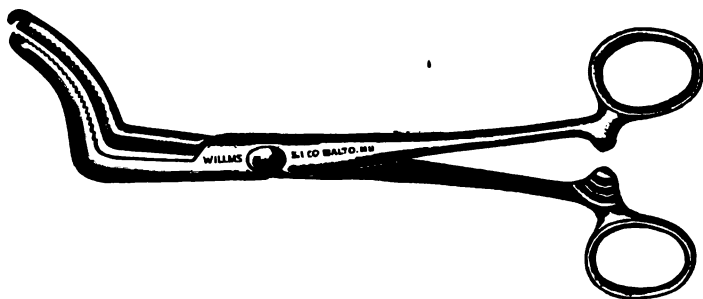
FIG. 90.—Hebb's modification of Earle's hemorrhoidal forceps.

be separated into individual tumors (just such a condition as would usually be dealt with by Whitehead's operation), and here a modification of Whitehead's operation, with either the straight or curved hemorrhoidal clamp is done; the latter is a modification of the writer's straight clamp by Arthur Hebb (Fig. 90).

The principle of this operation is the same as that given for the removal of individual hemorrhoids, except that the clamp is applied horizontally to the long axis of the bowel and the manner of proceeding is correspondingly different.

The hemorrhoids are caught at their uppermost limit by T forceps and all are drawn well down and outside the bowel. A longitudinal incision is made with scissors at the posterior

commissure, sufficiently deep to allow the hemorrhoids to be cut off horizontally below the border of the external sphincter. A suture is now passed through the mucous membrane at the upper angle of this wound, then over the lower border of the sphincter, and out through the skin; the suture is tied, thus drawing together the mucous membrane and skin at the upper
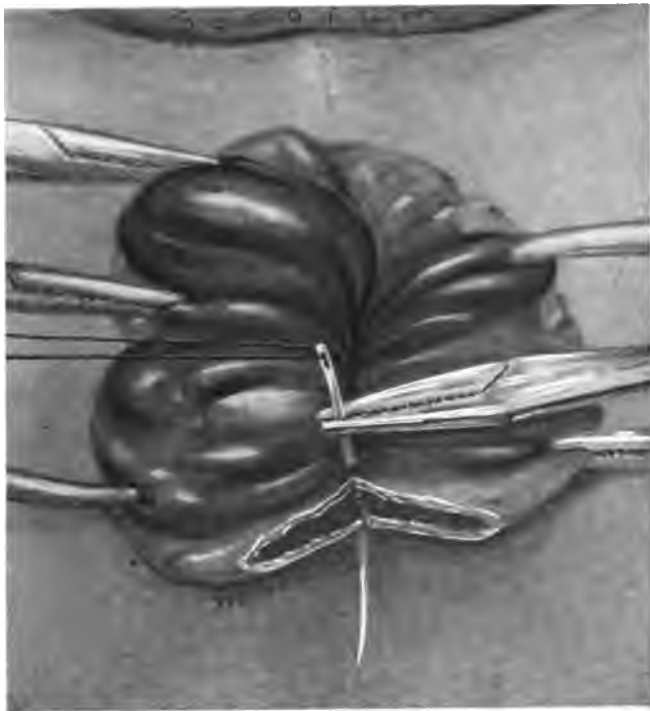
FIG. 91.—Earle's modification of Whitehead's operation—first step.

angle of the incision (Fig. 91). The curved hemorrhoidal clamp of Hebb is made to clasp the base of the protruding hemorrhoids, external to the sphincter and to the right of the longitudinal incision; the same suture is passed from within out, beneath the forceps (Fig. 92); the hemorrhoidal mass is then partly excised with Hebb's curved scissors (Fig.

93), beginning at the heel of the forceps. The hemorrhoidal mass is excised in sections. After each excision the suture is carried over the forceps to be introduced at their base on

FIG. 92.—Earle's modification of Whitehead's operation—second step.

the mucous surface, to be passed out again beneath the clamp. This alternate cutting and sewing is continued until all the hemorrhoids within the grasp of the clamp have been removed. The clamp is loosened and removed, and the suture drawn

taut by the aid of a hook at the end of the clamp, which approximates the mucous and skin surfaces over the sphincter, closes tightly the wound, and stops all hemorrhage. By sewing from within out the skin margin is turned in and thus ectropion of the mucous surface is prevented. The succeeding portions of the protruding hemorrhoids are successively clamped, excised and sutured in sections until they have all been removed and the suture is continuous from the beginning to the close, when its two ends are tied at the starting point (Fig. 94).

It will be seen that when the hemorrhoids are dragged down by T forceps, both the skin and mucous membrane slip easily down over and below the sphincter muscle, so that

FIG. 93.—Hebb's curved scissors.

with ordinary care there is only slight risk of excising any portion of the sphincter muscle, and that practically the same thing has been accomplished by this method as by the Whitehead operation, with much less risk of infection, far less loss of blood, and in much less time (from twenty to twenty-five minutes being the usual time taken by the author for the operation).

The packing is now removed from the rectum, the wound cleansed with sterile water and dressed with dry sterile gauze. I have several times done the complete operation very satisfactorily under local anæsthesia, using the ¼ and ½ of 1 per cent. solutions.

Complications.—It sometimes happens that the proximal end of an incised artery may be exposed between the stitches

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of the running suture. This can readily be observed before the close of the operation, when it can be controlled by running a mattress suture around it.

While primary union is much more certain to follow this modification than the Whitehead operation, because the cut surfaces are closed immediately, without being exposed to infection, yet it sometimes happens that the wound does become infected and consequently heals by granulation; it is when
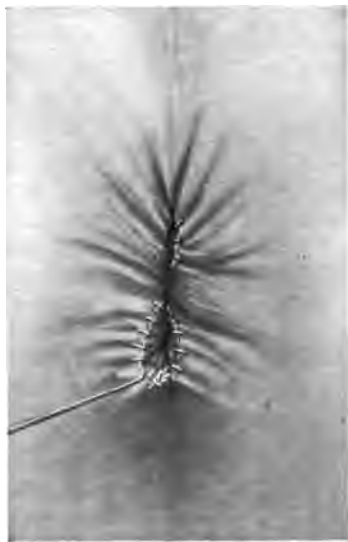
FIG. 94.—Earle's modification of Whitehead's operation—complete.

such an infection occurs that we are likely to have constriction of the anal orifice, and I am firmly convinced that any method of excising hemorrhoids which removes the skin and mucous membrane from the entire circumference of the anal margin is almost certain to be followed by constriction of the same if the operator fails to get union by first intention.

I am equally certain that in a certain class of cases there is a predisposition to the formation of fibrous tissue following operative procedures, which, so far as I know, cannot be

ascertained beforehand; therefore, it is best to make it a rule to dilate the anal orifice from eight to nine days after whatever operative procedure has been used for the removal of hemorrhoids; this to be repeated as often as the operator thinks best from the amount of constriction existing.

As it is conceded that such constrictions are more likely to follow operations where the skin and mucous membrane have been removed from the entire circumference, I recommend that whenever possible there should be strips of skin and mucous membrane left between the excised hemorrhoids.

For the past six months the author has pursued this method in every case of mixed hemorrhoids, and finds it most satisfactory even in those cases that are specially adapted to Whitehead's operation or any of its modifications. The following is the technic:

The internal hemorrhoids are removed individually, by Earle's straight clamp and suture method, not allowing the excised tissue to extend below Hilton's white line (Fig. 95). Transverse elliptical pieces of skin, subcutaneous tissue, and varicose vessels are then removed from the skin margin of the anus, not allowing the incision to extend beyond the mucocutaneous line. About three of these are removed from each side of the anal margin in aggravated cases, fewer in mild cases. If there are many varicose vessels under the strips of skin that are left between each elliptical incision, they are dissected out with curved scissors and dressing forceps. Spurting vessels are clamped and twisted. The compression by the dressing will control all oozing. The parts are then washed with a solution of 1 to 1000 bichloride of mercury, and a compress of sterile gauze is then applied with firm pressure, which is held in place by a T bandage. Subsequent dressings and sponging with the solution of bichloride of mercury are to be repeated several times daily. No attempt should be made to draw the external incision together by sutures, and it is remarkable how the edges of the wound coapt themselves, as will be seen (Fig. 96).

When this last method is used, it would be better to irrigate the rectum on the second and third day with tepid water, on account of the retention of blood and débris from the internal wound. This should be done in the recumbent posture, the discharge being received in a bed-pan, in order to avoid straining at stool.

General Complications following Operations for Hemorrhoids.—Probably the most common of these is strangury
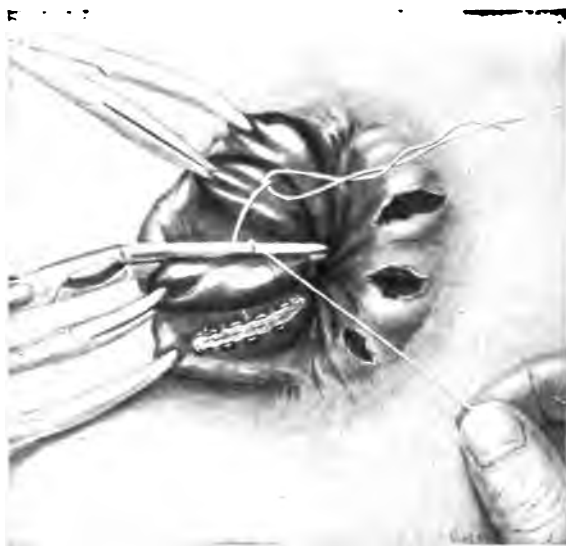
FIG. 95.—Modification of Earle's operation.

and dysuria. This is best overcome by permitting the patient to stand or sit up in the effort to pass water; if this fails, then moist heat in the form of cloths wrung out of hot water, with a hot-water bag over them, should be applied to the parts. If this fails, then the patient should be catheterized, but not until ample time has been given to accomplish the desired results.

SECONDARY HEMORRHAGE.—Should secondary hemorrhage follow an operation for hemorrhoids, no time should be

lost in placing the patient under a general anæsthetic and
ligating the bleeding vessels. We think this is far better than
to temporize with styptics, or to rely upon controlling the
hemorrhage by compression, through packing. They are too
uncertain, and do not justify the risk of excessive loss of
blood, which may occur before there are external evidences
of it.

Fig. 96.—Modification of Earle's operation—complete.

The author has recently encountered a case of secondary
hemorrhage which was undoubtedly caused by the systemic
effects of cocain, which had been administered as a local
anæsthetic for the removal of a mixed hemorrhoid. The
following is the report of the case:

Dr. C. W. McE. was operated upon by the author, Sep-
tember 2, 1909, for the excision of a mixed hemorrhoid, from

which he had lost considerable blood whenever he went to stool. The author injected a solution containing ⅕ grain of muriate of cocain, and immediately afterward proceeded to remove the hemorrhoid, first by clamping the internal portion of it, cutting it off and suturing it, while the stump was held in the clamp; the external portion of the hemorrhoid was cut off without suturing it. The wound was then dressed with sterile gauze and the patient placed in bed. Immediately afterward he complained of excessive heart action and some dizziness. Two hours after the operation the wound began to bleed, the blood oozing from the entire raw surface of the external portion of the wound to such an extent and in spite of firm pressure that it was deemed necessary to place him under a general anæsthetic and close the wound with cat-gut sutures. A heart sedative was administered after he came from under the general anæsthetic, to quiet the excessive heart action. While the patient was under the anæsthetic the author removed several other internal hemorrhoids, clamping and suturing them. There was no subsequent bleeding, and he made a most satisfactory recovery.

The patient subsequently stated that on two previous occasions he had had an excessive hemorrhage following the use of cocain, one from the extraction of a tooth, and the other from incising a boil, although he has shown no tendency to bleed from ordinary cuts or abrasions.

ERYSIPELAS, TETANUS, AND INFECTION.—These are all liable to follow operations on the rectum, or its surroundings. They can only be avoided by following a rigid technic during the operation and during the period of convalescence.

ULCERATION AND FISSURE.—These may also follow any of the operative procedures for hemorrhoids, and are to be treated as before recommended under their respective headings.

CHAPTER XI

PROLAPSE OF THE RECTUM

PROLAPSE (from *prolabi,* to slip down) signifies a falling or protrusion of the rectal wall from its normal position, whether within or without the anal margin and to all degrees of prolapse. I exclude procidentia (from *procidere,* to fall down) because the term is practically the same as prolapse and so is likely to be confusing.
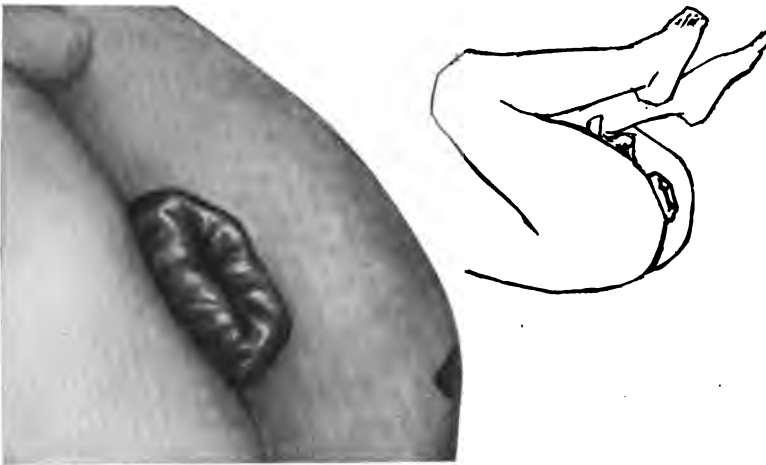
FIG. 97.—Incomplete prolapse.

Prolapse of the rectum is divided into *incomplete,* in which only the mucous coat of the bowel protrudes, and *complete,* in which all of the coats protrude.

INCOMPLETE PROLAPSE.—This is a protrusion from the anal margin of the mucous membrane of the rectum (Fig. 97) and due to undue stretching of the loose fibrous and elastic tissue that connects the mucous membrane to the submucous and muscular layer.

Etiology.—The disease is very frequent in young children who have been very much depleted in flesh by exhaustive

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summer diarrhœa, coupled with frequent tenesmus and straining at stool. It is also due to polypi, especially when pedunculated and attached just above the anal margin, where they are likely to be caught within the grasp of the sphincters and drag the mucous membrane down. They may also be due to the presence of internal hemorrhoids, which are liable to be caught in a similar manner during the act of defecation. It occurs in inflammatory conditions associated with œdema in the very old; from whatever interferes with the normal supports of the rectum, as dilatation of the sphincter or complete rupture of the perinæum through the anal orifice; or from any cause that separates the mucous from the muscular coat, or produces an undue amount of straining.

Symptoms.—The characteristic symptom of incomplete prolapse of the rectum is the undue protrusion of the mucous membrane beyond the anal margin. This may be very slight at first, and the prolapsed mucous membrane returns voluntarily, very promptly, after the act of defecation. Soon, however, the prolapse increases and its return into the rectum is correspondingly prolonged.

It may protrude partially or entirely around the anal orifice. It is frequently associated with hemorrhoids and neoplasms.

When the protrusion involves the entire circumference of the anal orifice, it is smooth on its surface, unless associated with hemorrhoids or neoplasms, and is divided into longitudinal folds by furrows, which correspond to the columns of Morgagni. There is always more or less protrusion of the mucous membrane of the rectum associated with extensive internal hemorrhoids. The color of the prolapsed mucous membrane is at first normal, but the part soon becomes inflamed and irritated from exposure and friction, followed sometimes by ulceration, slight hemorrhage, and sometimes constriction by the sphincter; the latter is not very common, however, in the incomplete form of prolapse.

Treatment.—The removal of the exciting cause, if it can be ascertained, is always the first step in the treatment, such as the excision of hemorrhoids, polypi, and other growths.

Where prolapse occurs in young children, it can generally be relieved without surgical interference by making the child have its movements (either on the lap of the mother or elsewhere) in a recumbent position, with its hips elevated, or through a very small opening in the toilet seat. The author has frequently had these seats made to order, to be placed over the ordinary seat of the toilet, with the opening four inches long by two inches wide at its greatest width for children, and three by six inches for adults.

When operative measures are necessary, the recommendation of Allingham for cauterizing the prolapsed mucous surface with fuming nitric acid is a most excellent one, but only satisfactory in the treatment of prolapse in children. This method, however, evidently did not originate with Allingham, as I saw it done in 1868 by Nathan R. Smith, who stated that such had been his practise for years, and he was then quite a noted surgeon of some seventy years of age. I have frequently used it since that time and can only recall a single failure in cases of incomplete prolapse in young children.

The technic is as follows: The bowels having been thoroughly emptied, the child is placed under a general anæsthetic; the rectal mucous membrane is stimulated by the introduction of the finger, and the bowel made to protrude; the mucous membrane is then wiped free of mucus with a clean towel or gauze; the glass stopper of the bottle with nitric acid is moistened with the acid by inverting the bottle, care being taken that the superfluous acid that accumulates in drops at the most dependent portion of the stopper be allowed to run back into the mouth of the bottle. The stopper is now introduced into the protruding portion of the rectal mucous membrane, great care being taken to prevent the acid from coming in contact with the skin margin of the anal opening; the stopper is held in contact with the mucous surfaces until they

become whitened. The mucous surface is now well anointed with olive oil, and the protrusion is replaced; a small pad is placed over the anus, and the buttocks are strapped together by strips of adhesive plaster; the child's legs are also held together by bandages, and the patient is confined to bed for ten days or two weeks, with the foot of the bed elevated six inches.

Let the bowels be confined by opiates for six or seven days, and the rectum emptied at the end of that time, first by injections of cotton-seed oil, and then by injections of moderate quantities of tepid water. The child is made to have the evacuation in the recumbent position, and the evacuations for the following two weeks should be made in a like manner.

The object sought by this method is the agglutination of the mucous with the submucous and muscular coats of the bowel by inflammatory adhesions. The amount of inflammation set up by the acid being slight seems only sufficient to correct the mild cases of prolapse seen in children, where the tissues have not lost their elasticity.

The operative measure now generally adopted for the treatment of partial prolapse in adults is excision with immediate suture. The writer is in the habit of treating this form of prolapse in the same manner that he does internal hemorrhoids, with his hemorrhoidal clamp and suture, using cat-gut. In the absence of the hemorrhoidal clamp an ordinary hysterectomy one will answer. The postoperative treatment of these cases will also be exactly the same as for internal hemorrhoids. I do not, however, approve of the ligature method as applied to internal hemorrhoids for the treatment of partial prolapse.

COMPLETE PROLAPSE.—There are three degrees of this form of prolapse:

First Degree.—That beginning at the anal margin and the prolapse involving the anal canal and varying degrees of the rectum, according to the extent of the prolapse.

Second Degree.—Where the prolapse begins directly
above the anal canal and therefore only involves the rectum,
to a greater or less extent, according to the severity of the
case, but the prolapsed portion always protrudes external to
the anal orifice (Fig. 98).

Third Degree.—Here the prolapse begins still higher up
in the rectum, or even in the sigmoid flexure and consists in

FIG. 98.—Complete prolapse of the rectum, showing circular arrangement of the rugæ.
(Tuttle.)

an invagination of the upper part of the rectum or sigmoid
into the lower, but does not usually protrude through the
anal orifice, although such is possible (Fig. 99).

These degrees vary in symptoms and require separate con-
sideration and treatment.

First Degree.—This soon follows that of incomplete pro-
lapse, is brought about by the same general causes, and is
frequently merely an exaggeration of the same; although it

sometimes happens that the latter is ushered in abruptly, without being preceded by the former. The local causes, such as hemorrhoids and polypi, so active in the production of partial prolapse, have little to do in causing the complete variety, as they only drag upon the mucous coat. Polypi that are attached above the anal margin are likely to be active factors in its production.

The characteristic feature of this form is the uninterrupted continuation of the mucous with the cutaneous surface, when the bowel is prolapsed; there is no sulcus separating the two,

FIG. 99.—Complete prolapse of the rectum—third degree.

as in the second degree; in this form also the mucous folds are circular, instead of longitudinal, as in the incomplete variety. It generally occurs first only when at stool; subsequently, when the sphincters and the rectal supports have become very much relaxed, it remains down continuously unless held in place by artificial means. It is sometimes brought about suddenly by lifting heavy weights in the stooping position, or by excessive straining.

Second Degree.—This differs from the first only at the starting point; in other respects it corresponds in the extent of the protrusion and symptoms with the first, as the prolapse

begins at a point above the anal canal and the rectum protrudes through it; there is a sulcus or space between the protruding bowel and the anal margin, into which a probe or sometimes even the little finger may be introduced to the depth at which the prolapse begins. As in the first degree, the second never results from hemorrhoids, or tumors, that are attached to the lower third of the rectum, nor does the second degree ever result from incomplete prolapse. It may be due to whatever produces persistent straining and prolonged effort at stool, such as stricture of the rectum, ulceration, or growths attached anywhere in the upper two-thirds of the rectum.

It is generally brought about gradually, but may be produced suddenly by violent straining. Sometimes it is extensive, being only limited by the length of the colon and its meson. When protruding more than four inches, it is likely to be curved backward, owing to the traction made upon it by the mesosigmoid, or mesocolon. There is no possibility of mistaking this form of prolapse for hemorrhoids or neoplasms.

The continued irritation and excoriation from prolonged exposure in chronic forms of prolapse, of either the first or second degree, sometimes give rise to a hypertrophic nodular condition, resembling very closely an epithelioma of the rectum, and only to be distinguished from it by a microscopic examination of one of the nodules. An extensive prolapse of either the first or second degree is likely to be complicated by a rectal hernia or archocele, or a descent of Douglas' cul-de-sac, in which are coils of the small intestine. In the early stages of the prolapse, the coils of the small intestine are only found in the anterior portion of the prolapse, but where the prolapse is from five to six inches long, then the small intestine may nearly surround the prolapsed rectum, a point to be remembered before carrying out certain surgical suggestions later to be described. This condition can easily be recognized by percussion around the circumference of the prolapse.

Third Degree.—This form differs materially from the preceding, on account of the prolapse not protruding from the anal margin except in rare and very aggravated cases. It is in reality an invagination of the upper part of the rectum, or lower part of the sigmoid, into the lower part of the rectum. As the rectum is capable of great distention in its lower portion, this invagination does not give rise to complete obstruction, as in ordinary invagination of other portions of the bowel, nor do the peritoneal coats or the invaginated portion become adherent and fixed as they do in the upper portion of the bowel. This condition is almost exactly similar to the second degree of prolapse, except that as it takes place higher up in the rectum and it rarely protrudes from the anal margin.

Symptoms.—The symptoms are very obscure. Nearly always there is a history of constipation which, however, may be followed by some diarrhœa; in either case the stool does not afford the usual relief and is followed by a sense of fulness, some bearing down, and a feeling as though there was still more fecal matter to come away; nor is this sensation relieved, but rather aggravated, by laxatives. Enemas are very much more effectual both in relieving the bowel of its fecal contents and in affording a sensation of relief. This it does, probably by lifting the bowel up from below and stimulating the reverse peristalsis, thus disengaging the invaginated portion. There may be a sense of weight and dragging in the sacral and lumbar regions, with dull aching pains radiating down the lower limbs; flatulence from the interference with the escape of gases, and a mucous colitis. The mucus may at first be clear, but subsequently is likely to be tinged with blood, due to the irritation from friction of the mucous surfaces rubbing against each other and from the interference with the circulation. In rare cases there may be associated with these symptoms membranous colitis, with marked exhaustion following the stools.

Etiology.—The causes are exactly similar to those producing the second degree, except that they are likely to be

higher up the rectum, such as growths, constriction of the bowel from any cause, especially at the rectosigmoidal juncture, stricture, an abnormally long mesosigmoid, ulcerations, or any cause that produces an undue amount of straining for the expulsion of the fecal matter.

Pathology.—It is perfectly evident to a close observer that there is more at fault in the production of prolapse than merely a relaxed sphincter, as frequently cases are seen of the latter condition without any prolapse. By reference to Chapter I, it will be seen that the rectum is held in position in its lower part by the levator ani and external sphincter muscles, perineal fascia and fibrous tissue attaching it to the coccyx behind, and to the prostate or vaginal walls in front; the middle portion is supported by the loose fibrous tissue which passes off from the sacrum along the course of the lateral sacral arteries and line the upper surface of the levator ani, thus connecting the organ with the osseous frame of the pelvis. The superior portion is held in position by the peritoneal folds which connect it with the pelvic walls upon the sides, the bladder or uterus in front, and with the sacrum behind. Above this the mesosigmoid comprises the chief support of the bowel.

One or more of these supports must be weakened or destroyed for the prolapse to occur. Those composed of fibrous and elastic tissue lose their efficiency through gradual elongation or rupture; those composed of muscular tissue, which are active supports, become inoperative through atrophy, injury, or paralysis.

With these changes there is generally a loss of perirectal fat in the spaces that surround the rectum.

Treatment.—The first requisite is the removal of the exciting causes if that can be ascertained, such as hemorrhoids, neoplasms, strictures; all ulcerations must be healed, and constipation overcome. If the prolapse persists, after the removal of the exciting cause, then the surgeon must proceed to restore the rectal supports.

If the condition has been the result of constitutional debility, or an exhausting disease, then this must be overcome by appropriate treatment before resorting to any operative measures to restore the rectal supports.

Schmey states that nearly all prolapses in children may be radically cured by the administration of phosphorus in increasing doses. I have never tried this method, but its simplicity commends it. Similar results may be expected, in debilitated subjects, from the use of strychnia and arsenic; also both the galvanic and faradic currents assist the muscular tone.

While waiting for the beneficial effects from such constitutional remedies, it is very important to retain the rectum in its normal position by the recumbent position of the patient, with the foot of the bed well elevated, and by the local application of such means as will stimulate the contraction of the sphincter muscles, cold applications being one of the best for this purpose. The patient should also be required to have his stools in the recumbent position.

If the rectum is in the habit of prolapsing at other times than when at stool, then the buttocks may be strapped in the intervals between the stools.

Constipation can best be overcome, first, by laxative foods, such as fruits and vegetables, then by very gentle laxative medicines, and lastly, for immediate effect, enemas of a moderate quantity of cold water. These conservative measures may be tried for several weeks before resorting to operative procedures. If, however, the prolapse is extensive, is attended with spasm of the sphincter, turgescence and sloughing of the parts, delay is unjustifiable. Such a condition is not likely to occur in children or in old people, and even when it does occur in adults of middle age, the sloughing is generally limited to the mucous membrane, but sufficient to be followed by cicatricial contraction, which is very difficult to heal.

REDUCTION.—While ordinarily the prolapsed bowel will return spontaneously, or with such assistance as the patient will himself give, it sometimes happens that it becomes so

swollen, either from being allowed to remain down too long, or from the contraction of an irritable sphincter, that the patient is unable to replace it, and seeks the assistance of a physician. Generally it will be unnecessary to give a general anæsthetic for this purpose, and it should be avoided if possible on account of the nausea following.

By inverting the patient over the end of a table or bed, with his head on the floor, and allowing him to remain in that position five or ten minutes, it can generally be returned without much trouble. If this should fail, then the general anæsthetic may be administered and the bowel replaced.

If when called to a case of prolapse there should be very great congestion, œdema, strangury or sloughing, firm pressure with hot cloths should be made to the prolapsed bowel for some time before attempting to reduce it. Cold applications are never advisable in these extreme cases, as the blood-vessels have become too much distended to respond to its action, and it is therefore likely to reduce still further the depression in the vitality of the parts, and to produce sloughing. In reducing the prolapsed bowel, let pressure be made through the lumen at its end. A piece of gauze must be wrapped about the index finger in order to prevent slipping and to carry the prolapsed bowel back ahead of the finger; at the same time gentle pressure is made upon the body of the prolapsed bowel by the knuckles of the same folded hand, great care being taken to avoid bruising the bowel. The gauze that was wrapped around the finger may be allowed to remain, if it is adherent, as it will likely be, until more fresh mucus is poured out on the surface.

After the bowel has been reduced a hypodermic of morphia, for adults, or a dose of paregoric for children, will greatly relieve the straining and quiet the peristalsis.

If extensive sloughing has taken place, it is dangerous to return the prolapsed bowel in that condition, for fear of general sepsis and hemorrhage, and it is better to proceed at once to amputate the prolapsed bowel, as described later.

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OPERATIVE TREATMENT.—The method to be used will depend upon the extent and the degree of prolapse. If the prolapse is of the first degree, and of only moderate extent, it will only be necessary to narrow the anal opening in order to prevent the prolapse. If it is an aggravated form of the first or second degree, where the active and passive supports have been stretched or ruptured, they must be restored, or others must be devised to take their places.

As previously stated, the method of Allingham for producing adhesions between the coats of the rectum will not answer in these aggravated cases of the first and second degree in adults, nor is the suggestion of Van Buren's for accomplishing the same result by linear cauterization with the thermocautery much better.

In the milder cases of the first and second degree, the recommendation made in the aggravated forms of incomplete prolapse, of removing the prolapsed mucous membrane, by Earle's modification of Whitehead's operation, may answer, and should be tried.

Whitehead's operation is applicable to cases which prolapse even to the extent of from four to six inches, as the mucous membrane can be dissected up from the skin margin, while the bowel is prolapsed to that extent; then cut it off, and the upper margin of the cut mucous membrane can then be attached to the mucocutaneous margin at the anal orifice, the exposed submucous and muscular coats being turned in, in order to make the two cut edges of the mucous membrane approximate. The technic for this operation, when used for this purpose, must be very rigid, for if union by first intention fails there will be a very large raw surface exposed by the retraction of the mucous membrane. The healing of such a large raw surface would not only require considerable time, but would almost certainly be followed by a very annoying stricture at the anal orifice. I would, therefore, hesitate to recommend this method to any except the most skilful surgeons, and even then I think it safer to try one of the other

methods to be described later on; because any operation for the relief of the aggravated forms of the first and second degree of prolapse limited to the mucous membrane is likely to prove ineffectual, and I think those operations involving the deeper tissues are preferable.

Among these is that advised by Lange. He makes an incision from the posterior margin of the anus upward alongside of the coccyx and deep enough to expose the posterior wall of the rectum. The levator ani muscle is dissected back, to be replaced before closing the wound; the walls of the bowel are then folded in by a line of longitudinal sutures introduced through the muscular layer, extending well around on each side and then tied, thus narrowing the calibre of the bowel and at the same time stiffening its walls. The wound is then closed and left to heal by first intention.

Verneuil (*Gaz. des hopitaux*, May 2, 1892) modified Lange's method by gathering the bowel in horizontal folds, after which he sutured it to the sides of the coccyx and sacrum by buried sutures, and then closed the external wound.

As both these operations consist only in suspending the lower end of the rectum to the surrounding parts by inflammatory adhesions, and in narrowing its lumen, they do not answer for the relief of aggravated cases. George R. Fowler (*Medical News*, New York, February 27, 1897) was the first to suggest attaching the rectum to the coccyx by sutures, then by inflammatory adhesions; the suggestion of this principle by Fowler led to the introduction of rectopexy by James P. Tuttle, the technic of which is:

RECTOPEXY OR SUSPENSION OF THE RECTUM UPON THE SACRUM.—The patient is prepared by a thorough cleansing of the intestinal canal, shaving the perinæum and sacral region, and applying an antiseptic dressing the night before. After being anæsthetized, he is placed in the semiprone position on the left side, with the hips elevated on pillows and the thighs well flexed on the abdomen. The prolapse is then dragged down to its full extent and held forward by an assistant. A

curved incision about two inches in length is made midway
between the coccyx and anus (Fig. 100). This is carried
through all the tissues into the retrorectal space. With the
fingers, or a dull instrument, introduced through this incision,
the rectum is separated from the coccyx and sacrum pos-
teriorly, as high up as the attachment of the mesorectum and
on the sides as far as the attachment of the lateral ligaments.

FIG. 100.—Rectopexy for procidentia recti—the incision. (Tuttle.)

Let the latter be sedulously preserved. The anterior surface
of the bone is then gently curetted to remove all the fatty
tissue and to freshen it. At this point the assistant reduces
the prolapse, and with his fingers inside the gut inverts and
brings it out through the incision (Fig. 101); the operator
catches the protrusion and drags the gut down as far as it
will come, usually a little less than the amount prolapsed
through the anus. The external surface, or muscular wall of
the gut, thus exposed is then curetted as was the sacrum.

Silkworm-gut or silver-wire sutures are then passed transversely through the muscular layer, embracing as much of the circumference of the gut as possible; they are placed one-half inch apart, and the ends left six to eight inches long. After the sutures have been placed, the ends of the upper ones are each in turn threaded on a long, curved, Peasley needle and carried up through the wound to the highest point of sepa-

Fig. 101.—Rectopexy—the gut inverted and brought through the incision; the suture passed through its muscular walls.   (Tuttle.)

ration between the rectum and sacrum, where they are made to penetrate the tissues, and are brought out through the skin on opposite sides of the bone.   The other sutures are treated in like manner, each being brought out one-half inch lower than the preceding one (Fig. 102).   The ends are then drawn taut, and the prolapse is thus dragged up into the hollow of the sacrum where it belongs.   A pad of gauze is laid over the sacrum and the sutures tied over this to avoid their cutting

into the skin (Fig. 103). Before tying the sutures the space
between the rectum and sacrum should be freed from all clots
and oozing checked. The gut is thus anchored in close appo-
sition with the sacrum, to which it unites in due time. The
external wound is closed by buried cat-gut and subcutaneous
sutures. If the sphincters are much relaxed, or over-
stretched, a ligature of kangaroo tendon (Fowler) is passed

Fig. 102.—Rectopexy—the sutures out through the tissues on each side of the sacrum.
(Tuttle.)

around the anus at the upper margin of the external sphincter,
and tied over the index finger introduced through the anus,
as has been advised by Platt. This narrows the anal outlet
and causes contracture of the muscle, thus contributing to the
cure. The bowels are confined for eight days, when they are
moved by enemata. The patient is required to remain in bed
and use the bed-pan for three weeks, after which time he may
be allowed to go to the toilet. The anchoring sutures are
left in from ten to fourteen days.

Up to the publication of his work on " Diseases of the Anus, Rectum, and Pelvic Colon," 1905, Tuttle had operated in ten cases; three of them in old people, five in people of middle age, and two in children. In two of these the procidentia had existed for fifteen and eighteen years respectively. Seven of them remained cured from one to three years. Three have been done less than one year, but so far there has been no recurrence.
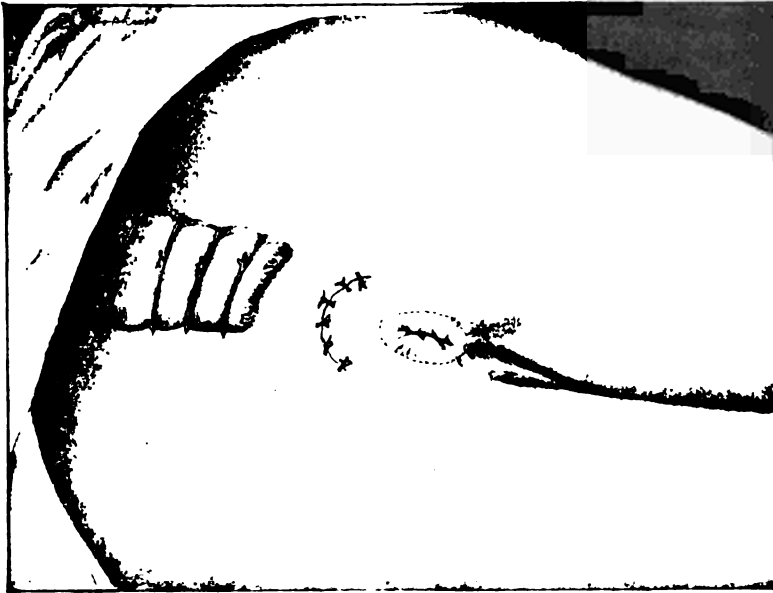
FIG. 103.—Rectopexy—the operation completed.   (Tuttle.)

I myself have performed this operation very satisfactorily and successfully on two cases of prolapse of the first and second degrees.

The operation is applicable to cases of the first and second degrees of prolapse only where the protrusion does not extend more than five or six inches. Where more extensive than this, it would be well to try the suggestion to be recommended later for the treatment of prolapse of the third degree, viz., sig-

moidopexy, as doubtless many of these cases are either due to, or are very much aggravated by, an abnormally long meso-sigmoid. In aggravated cases of the first degree, in addition to the suggestion to prevent the prolapse by sigmoidopexy, it has sometimes been suggested in the same case to narrow the anal outlet by the Dieffenbach-Roberts operation, which consists in the removal of a section of the rectum at its posterior commissure, extending about two inches up. The entire thickness of the intestine with the sphincter muscles is removed, and the edges of the wound carefully approximated and kept together by cat-gut sutures. This narrows very greatly the calibre of the lower end of the rectum and anal canal. The success of this operation depends upon the primary union of the parts. If this fails, there is likely to be an increase of the prolapse and incontinence of fæces.

TREATMENT OF PROLAPSE IN THE THIRD DEGREE.—As this condition depends upon the giving way of the superior supports of the rectum, or upon an abnormally long meso-sigmoid, the means for relief must be very different from those used for the first and second degrees of prolapse, but the exciting causes must be removed, if any exist, as in those of the first and second degrees; if a stricture, dilate it, or resect. While necessary to remove these before attempting to restore the superior rectal supports, no permanent relief can be looked for until the latter are restored. Very decided temporary relief may also be afforded to those suffering from prolapse of the third degree, by the daily introduction of a long Wales bougie, at a stated time before the daily evacuation, by which the bowel is carried back in position and its movements greatly facilitated.

As shown, prolapse of the third degree is due principally to an abnormally long mesosigmoid; the best means for correcting this is by drawing up the sigmoid and rectum and attaching it to the abdominal wall. This is known as sigmoidopexy.

SIGMOIDOPEXY.—This operation consists in opening the abdomen between the umbilicus and pubis to the outer side of

the left rectus muscle. The sigmoid and rectum are now caught and drawn up until taut; the parietal peritoneum is stripped back for half an inch from the edges of the abdominal wound when one of the longitudinal bands of the sigmoid is made to protrude between the inner edges of the wound for its entire length, and attached to it by a row of silk sutures
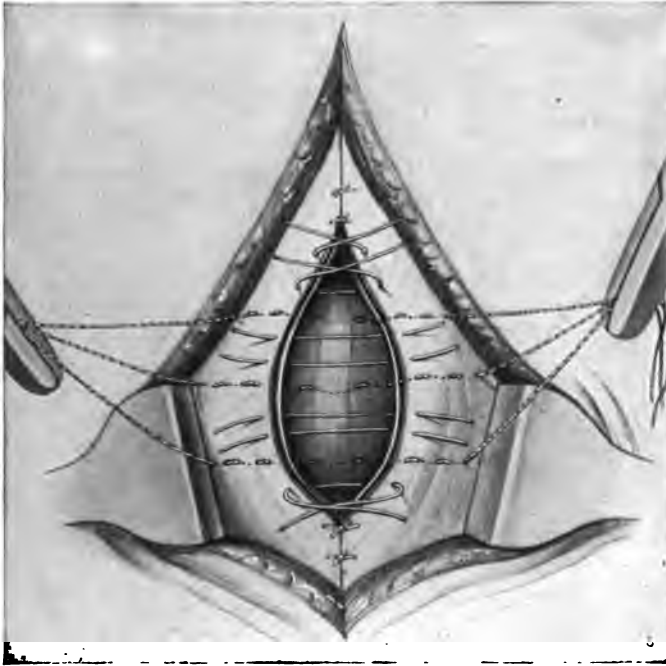
FIG. 104.—Sigmoidopexy—showing method of placing the suspensory and other sutures when the gut is brought into contact with the parietal peritoneum. (Gant.)

that are passed, first, through the lower edges of the wound on one side, then through the longitudinal band of the sigmoid, and out through the lower edge of the wound on the other side. This method of attaching the sigmoid the entire length of the abdominal wound has recently been recommended by Samuel G. Gant in his work on "Constipation and Intestinal Obstruction" (Fig. 104), and gives a much firmer attach-

ment than the former method, where it was attached below the abdominal wound only. The abdominal wound should then be closed in the usual manner.

The results of this operation for prolapse of the third degree are most gratifying, and the operation is also very satisfactory for aggravated cases of the first and second degrees, when combined with some one of the methods recommended for narrowing the anal orifice, or of suspending the lower portion of the rectum from the sacrum as before recommended.

EXCISION.—This operation is so likely to be attended with or followed by serious complications that it should not be undertaken unless the methods previously described have failed, or where the prolapse cannot be returned. In the latter cases, if the strangulation has resulted in sloughing, or gangrene, the operation of excision, although very necessary under these conditions, yet is very likely to be attended with very serious risks of septic peritonitis.

Where the prolapse has been due to organic stricture, which protrudes with the prolapsed bowel and is at the lowest point of the prolapse, the whole may be excised, and thus the stricture and the prolapse can be relieved by the same operation. The other conditions which seem to justify excision of the prolapse are neoplasms, involving the entire thickness of the rectal wall, and adhesions, which prevent the reduction of the prolapse.

Excision is only adapted for the relief of aggravated forms of prolapse of the first and second degrees.

Of the many methods in use the one suggested by John H. Cunningham, Jr., of Boston, Massachusetts, seems to offer the most advantages and to be the simplest. It is as follows:

Preparation for the Operation.—If ulcerations exist upon the prolapsed mass, or if the mass is acutely inflamed, let treatment be directed toward the improvement of these conditions before the operation is undertaken. The same is true of foul vaginal secretions, and of certain cases of eczema of

the buttocks. A light diet and purging of the bowels is to be instituted at least two days before the operation, so that the bowel will be free from contents. Just before coming to the operating table, let the lower bowel receive a copious irrigation of 4 per cent. boric acid solution, and made to return. The vagina should be flushed in a similar manner.

Operation.—The patient is placed in the lithotomy position, with the buttocks well over the end of the table. The protruding mass and the surrounding parts are made clean by soap and water and alcohol and the vagina packed with sterile gauze.

The protruding mass is covered with sterile gauze and drawn outward. The rectal sphincters are usually so dilated that they cannot be defined. An incision is made with a knife at a point three-quarters of an inch from, and parallel with, the anal margin. This incision will usually be beyond the internal sphincter. Let it be carried through all the layers of the gut, thus opening into the pocket of the peritonæum beneath. A pair of scissors now continue this incision around the whole circumference of the protruding mass (Cunningham, Fig. 105). The edges are widely retracted, as a loop of intestine may be within the peritoneal pouch. If so, it should be forced back into the abdomen before the cut is continued.

This incision complete, the outer layer of the protruding mass is rolled inward by pulling the cut edge outward and rolling the mucous-membrane surface inward, thus doubling the length of the protruding gut (Cunningham). The gut is drawn outward until taut, and a clamp with flexible jaws placed as high as possible. The hemorrhage from the cut end of the intestine will thus be arrested. This hemorrhage about the margin is usually an ooze; if, however, there are bleeding vessels in it, they should be snapped but not tied. The protruding gut is turned upward and the mesentery of the rectum inspected, when vessels which bleed considerably and require ligation will usually be found. It is important to control all hemorrhage from the mesentery, as intra-abdominal

hemorrhage will otherwise result, following the completion of the operation. The gut having been drawn outward until . taut, the clamp having been placed on the gut as high as possible, and the hemorrhage having been controlled, the distal portion of the gut is removed by a knife about one-half inch beyond the clamp (Cunningham, Fig. 106).
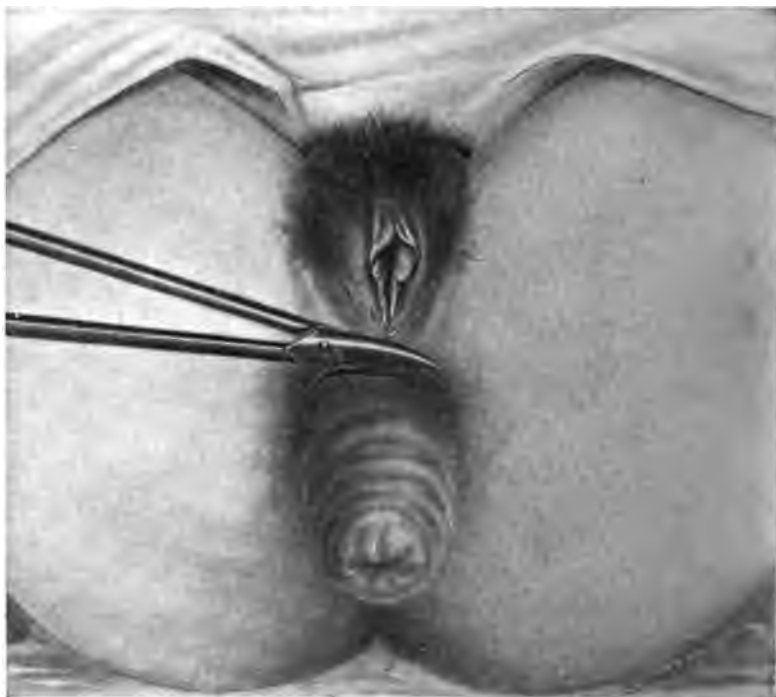
Fig. 105.—Shows the incision three-quarters of an inch from the anal margin. The scissors are in position to continue the incision around the full circumference of the mass.

It remains now to unite the cut edges of the distal portion of gut beyond the clamp to the proximal portion surrounding the anus. This has been done by a buttonhole stitch of No. 2 chromatic cat-gut, each stitch being made to include at least a quarter of an inch of each cut portion of gut (Cunningham. Fig. 107). The stitch is made to unite all the layers of the

cut ends until the clamp is reached, when the clamp is removed and the small space previously occupied by it included in the sutures. The end of the suture is tied to the end made by the first knot, and union is complete, the hemorrhage from the cut gut being controlled by the buttonhole suture.

FIG. 106.—Shows clamp applied to the gut as high as possible after gut has been drawn taut. The knife is cutting off the gut one-half inch beyond the clamp.

A piece of rubber tubing four inches long is surrounded by iodoform gauze and made sufficiently large to fill the gut entirely, at the point of suture. This is placed within the gut, its passage being facilitated by smearing it with boric acid

ointment. The packing is removed from the vagina and replaced with iodoform gauze. A self-retaining catheter may be placed in the bladder and siphon drainage established if it is deemed best. A suitable dressing should be applied to the perinæum.

AFTER-TREATMENT.—Let the patient be kept on a light diet, and pil. opii. gr. 1 given night and morning to prevent

FIG. 107.—Shows the position of the gut distal to the clamp being sutured by a button-hole suture of No. 2 chromic catgut to the border of gut surrounding the anal margin. The end of the suture at the first knot is left long to be tied to the other end of the suture when the anastomosis is complete.

the bowels from moving. If siphon drainage of the bladder is not employed, let the patient be catheterized at regular intervals for several days. The rectal plug must be left in position for a week, providing the local condition remains satisfactory. After its removal the rectum is to be irrigated with 4 per cent.

boric acid solution by means of a glass syringe, the amount
being never more than two ounces at a time for fear of causing
a desire to evacuate the fluid. With each injection the fluid
is sucked out. With the bowel thus cleansed, one-half ounce
of iodoform emulsion is injected and allowed to remain.
This procedure should be performed once daily, provided the
local condition remains clean. If not so clean, the procedure
should be practised several times daily. It is desirous to pre-
vent the bowels from moving for ten days, unless symptoms
arise which necessitate a movement before this time. If so,
inject four ounces of oil into the rectum to soften the fecal
masses, and administer a purge. After the movement the
iodoform emulsion should be injected.

Keep the patient under observation for a year or two in
order to detect any contraction at the point of suture. If
this be detected, dilate by rectal bougies.

COMPLICATIONS OF PROLAPSE.—Jerome M. Lynch, of
New York, reported a very interesting case of " Prolapse of
the Uterus, Vagina, and Rectum, with Multiple Adenoma of
the Rectum and Sigmoid and a Diverticulum of the Sigmoid,"
to the American Proctologic Society, June, 1909, in a woman
aged seventy-one on whom he operated successfully. He
removed the uterus and adnexa, after which the broad and
round ligaments of each side were sewed together, in order
to strengthen the pelvic floor. The sigmoid was next sus-
pended to the abdominal wall, and the abdomen closed. The
rectum was now excised, after the method of Mikulicz, as
modified by Tuttle, an end-to-end anastomosis being done.
The patient made an uneventful recovery, both the abdominal
and rectal wounds healing by first intention. The following
illustrations show the conditions before and after the operation
(Figs. 108, 109).

Other complications of prolapse of the rectum have already
been alluded to and described, such as neoplasms, whether
attached superficially to the mucous membrane or those involv-
ing all the coats of the bowel, inflammatory conditions,

strangulation and hernia. There are a few that have not been referred to, such as dysenteric inflammation, or infectious proctitis in children, as distinguished from ulceration due to exposure and friction of the mucous membrane in old cases of extensive prolapse. In the first class of these cases the dysenteric ulceration is frequently a cause of the prolapse and a subsidence of it will generally result in the relief of the pro-

Fig. 108.—Prolapse of the uterus, vagina, and rectum, with multiple adenoma of the rectum and sigmoid, and a diverticulum of the sigmoid (before the operation).

lapse, whereas the second form is a result of the prolapse. The latter cases have already been alluded to. The former are best relieved by sponging off the prolapsed mucous membrane with warm and mild antiseptic and astringent solutions, after which the prolapse is to be reduced and held in position

by compresses, strapping of the buttocks, and confining the patient to the recumbent position, with feet and hips well elevated. The tenesmus should be relieved by appropriate doses of opium.

Other complications are hemorrhage from the prolapsed mucous membrane, best controlled by weak solutions of suprarenal extract, and confinement to the recumbent posture. Cold is not to be applied for this purpose in these cases, on account of its liability to be followed by sloughing.

FIG. 109.—Prolapse of the uterus, vagina, and rectum, with multiple adenoma of the rectum and sigmoid, and a diverticulum of the sigmoid (after the operation).

Age should not be considered a contra-indication against attempts at permanent relief of prolapse.

Another complication may be due to the invagination of the whole of the large bowel, and in some instances of a portion of the small intestine also, in which the invaginated portion either protrudes into the rectum, simulating the third degree of prolapse of that organ, or the invaginated portion may even protrude through the anal margin. I saw a case of this description resembling the third degree of prolapse at St. Joseph's Hospital, May, 1908. The case was referred to me

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as coming under my service in rectal surgery, but I recognized it as no true prolapse of the rectum and referred it to one of the general surgeons on the staff, who upon opening the abdomen found that the invagination involved first about six inches of the ileum into the cæcum, the cæcum into the ascending colon, and the entire large bowel, including the sigmoid, was invaginated and prolapsed into the rectum. It was impossible to release the invaginated bowel, so the whole of the portion was excised and an anastomosis made between the ileum and the rectum. The condition had existed for three or four days, and consequently the patient was suffering very much from shock when operated on, and died at the end of twenty-four hours.

RUPTURE OF THE HERNIAL SAC.—The last of these complications to be mentioned is rupture of the hernial sac through the rectal wall. Kelsey (" Diseases of the Rectum," 4th ed., page 240) gives a most interesting collection of cases of this kind.

This accident may occur spontaneously during straining while at stool, so common and pronounced in these cases; from vomiting; from lifting heavy weights, or through efforts at reduction of the prolapse and hernia.

If the rupture occurs while the bowel is prolapsed, the protrusion of the small intestine or other contents of the hernial sac will be readily recognized. The prolapse is likely to be spontaneously reduced after the rupture takes place. If it occurs when the bowel is not prolapsed, it will not likely be recognized except through the general symptoms, such as acute pain, which is followed by collapse and shock. This should lead to an examination of the rectum, when the presence of the small intestine or sigmoid would readily be recognized.

The primary conditions which lead to this accident are the result of changes in the rectal wall, brought about by the abnormal conditions incident to the prolapse, which weaken it very materially. There may be marked extravasation of blood between the mucous and muscular coats of the bowel, following

the rupture. If the case is seen soon after the rupture, the protruded bowel must be properly cleansed with sterile water, returned, and the rent sewed up. The results are not so serious, but if allowed to remain down any length of time the protruding intestine is likely to become strangulated.

Great care must be taken in returning the prolapsed intestine. It should be carefuly washed off with a warm saline solution, and when replacing it the physician should be sure that it is returned into the pelvic cavity, and not simply pushed back into the rectum.

If the protruding intestine is gangrenous when seen, let the gangrenous parts be excised and an end-to-end anastomosis done. The intestine may now be returned and the rent in the rectum closed, by first stripping back the mucous membrane from the edges of the wound, drawing the serous edges together, and uniting them by a running suture; the mucous edges are now drawn together and united by a second row of sutures.

It would be well to take advantage of this opportunity to permanently relieve the prolapse by doing a sigmoidopexy, as before described in this chapter. Both of these procedures can be done while the patient is under the anæsthetic for the rupture of the hernial sac.

CHAPTER XII

STRICTURE OF THE RECTUM

STRICTURE of the rectum consists of a narrowing of its lumen by an infiltration and subsequent contraction of its walls, but does not include a narrowing of its lumen by pressure from without, or by obstruction of its calibre by growths or by foreign substances from within. This infiltration does not necessarily imply a. previous abrasion of its surface, as will be seen from strictures following secondary and tertiary syphilitic inflammation of the submucous connective tissue of the rectum, as in the formation of gumma, or the involvement of the circular bands of fibrous tissue that enter into the formation of Houston's valves by a similar form of syphilitic inflammation, and which may result in a valvular stricture of the rectum. This may be confined only to its mucous and submucous coats, or may involve all the coats of the bowel.

The different degrees of constriction have given rise to the following subdivisions, viz., *annular, tubular,* and *linear.* These, however, merely indicate the extent of the infiltration and the form it assumes, regardless of its character. Any form of chronic inflammation of the rectal walls is liable to be followed by infiltration, which thickens the walls and narrows the lumen.

Certain forms of inflammation, due to a specific cause, such as syphilis and tuberculosis, are more likely to be followed by excessive infiltration, and in certain individuals there is unquestionably a greater tendency to this fibrous infiltration than in others. It is therefore unnecessary to subdivide strictures of the rectum by their etiological factors as generally done, remembering that it is only the extent and probably the density of the infiltration influenced by them.

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There is one exception to the definition we have given above of stricture of the rectum, namely, *spasmodic* stricture of the rectum, which, however, is a functional and not an organic constriction.

The different causes giving rise to stricture of the rectum may be thus classified: congenital, intramural neoplastic, spasmodic, and inflammatory. Any of these causes existing in any part of the rectum, or even if confined to the rectal valves, may give rise to stricture.

Congenital Strictures.—These have already been considered under the head of malformations, although frequently they pass unobserved into adult life, two such cases having been reported to the American Proctologic Society, June, 1909, by Louis Hirschman, of Detroit, Michigan, where in two females the rectum opened into the vagina by a narrow constricted canal, which served the purpose of the normal anal opening until adult life, when they presented themselves for a correction of the abnormality before entering into marital relations. Such cases may also continue unobserved until they present themselves for the relief of constipation, when an examination shows the true nature of the cause, hence the necessity of a thorough examination of all such cases before undertaking treatment. The stricture in such cases, where the patient has been able to get along for some years with so little trouble is likely to be at the juncture of the anus with the rectum, due to an incomplete union of the two, or in the rectovaginal variety of the same, which are the only two varieties of such abnormalities where the patient can get on for such a length of time with so little trouble.

Treatment.—The permanent relief of such cases is only accomplished by the application of the radical measures before recommended under the head of such abnormalities.

Intramural neoplastic stricture is one that narrows the lumen of the bowel by increasing the thickness of its walls by a new growth, as, for instance, sarcomata and carcinomata, especially the scirrhous variety of the latter. Its subsequent

growth from the mucous surface of the bowel into its lumen is only an obstruction, not a stricture. This form of stricture will be treated under the head of Malignant Growths.

Spasmodic Strictures.—A spasmodic stricture only exists in response to a reflex irritation; and only continues so long as the irritation is kept up, and is not attended with organic changes. In the notable case cited by Cripps ("Diseases of the Rectum and Anus," Fig. 46, page 207) and also a similar one reported by Ball, the spasmodic contraction of the circular muscular fibres, which resulted from the irritation of the existing ulcer, relaxed when the irritation was removed; therefore, the stricture was only functional. This condition must not be confounded with that found two years later in the same patient, when the ulcer had healed and a permanent organic stricture existed. The latter condition of the stricture was unquestionably due to the cause that exists in all organic strictures, namely, the formation of scar tissue following the healing of the ulcer, and was not due to any permanent shortening of the circular muscular fibres resulting from the spasmodic contraction caused by the reflex irritation of the ulcer.

Inflammatory strictures are those that result from *simple, traumatic, tubercular, syphilitic,* or any form of inflammation and ulceration involving the tissues beneath the mucous membrane. Any form of ulceration likely to be followed by scar tissue and infiltration of the submucosa will be followed by a stricture to a greater or less extent. This will occur in any part of the rectum where there is submucous tissue, including the valves of Houston.

I mention the different causes giving rise to stricture of the rectum because certain ulcerations, such as tubercular and syphilitic, are not only more likely to be followed by stricture but even give rise to aggravated forms of it.

Location.—The site of the stricture depends entirely upon the primary lesion causing it; no one portion of the rectum, therefore, is any more liable to stricture than another, except those parts that are more susceptible to injury.

Simple Inflammatory Strictures.—These may result from any abrasions or ulcerations of the rectal mucous membrane sufficient in extent to involve the submucosa. In some cases all appearance of the primary sore in the nature of a scar on the surface may have disappeared, yet a diffuse inflammatory condition may have involved the submucosa, which results in a fibrous infiltration and the formation of a stricture to a greater or less degree. Such a diffuse and inflammatory condition of the submucosa may also extend from a blind fistula into the surrounding submucous tissue, and be so extensive as to narrow the lumen of the rectum, causing a stricture. This may occur without any involvement of the mucous membrane of the rectum. Inflammatory conditions in the pelvis originating in the uterine appendages, or in the prostate, may also extend to the cellulofibrous layer which surrounds the rectum, resulting in extensive deposits of fibrous tissue and giving rise to stricture of the rectum.

The fact shown above, that the production of a stricture depends upon an involvement of the submucosa in the inflammatory process, explains why the more superficial catarrhal ulcerations rarely if ever result in stricture.

Traumatic stricture is one due to injury to the rectal wall of such an extent as to result in inflammation, ulceration, or necrosis, as the healing of wounds by granulation, that result from surgical operations, involving the submucosa; prolonged and undue pressure by the fetal head during labor; abrasions by foreign substances from within and without; the necrotic action of certain drugs, introduced into the tissues of the rectal wall for the destruction of certain growths, such as hemorrhoids; from the sloughing that may result from a strangulated hemorrhoid or from a prolapse of the rectum, or from any traumatism that may result in ulceration and the formation of cicatricial tissue. Remember, when operating for hemorrhoids, the peculiar susceptibility of certain individuals to the formation of fibrous tissue following any injury to the submucosa.

Tubercular Stricture.—That tubercular ulceration of the rectum and the anal canal may not only result in stricture but in very pronounced forms of it, is now proven beyond all doubt by the frequent finding of giant cells and tubercular bacilli in the scar tissue of strictures. Until recently it was thought that primary tubercular ulceration of the rectum was rare, and that when it did occur it was so soon followed by a general infection that there was rarely an opportunity for the deposit of sufficient fibrous tissue around the ulcer to result in any narrowing of the lumen of the bowel.

Frequent microscopical examinations of the scrapings from ulcers, abscess cavities, and fistulous tracts have demonstrated the presence of tubercular bacilli in many cases where there were no pulmonary or general symptoms to indicate the presence of the disease. These findings, taken in connection with the extensive fibrous deposits often found around such tracts, would add additional weight to the other evidence that such is not an infrequent cause of stricture of the rectum.

Referring again to tubercular ulceration, as a cause of stricture of the rectum, Mitchell, Hartmann, Toupet, and others (Tuttle, " Diseases of the Anus, Rectum, and Pelvic Colon," page 469) have demonstrated these same characteristics, and thus proved beyond the shadow of a doubt that tuberculosis may result in the formation of true fibrous stricture of the rectum, without the ulcers having healed.

Syphilitic Stricture.—I believe the same rule applies to syphilitic strictures as to the other varieties before mentioned in this chapter, namely, that they result from a local ulceration involving the submucosa, with the addition of certain peculiar characteristics belonging to this disease, such as predisposition to the formation of nodular or gummatous enlargements around the blood-vessels, and the endarteritis within. These special characteristics are attended with an extensive infiltration of fibrous tissue following syphilitic ulceration, hence the frequent occurrence of extensive syphilitic, tubular strictures. The extent of infiltration in these cases bears no

relation to the size of the ulcer giving rise to it; on the contrary, such ulceration is frequently so slight as to pass unnoticed, and for that reason patients giving a history of a primary syphilitic sore should be carefully examined for secondary ulceration of the rectum whenever they show any symptoms of rectal irritation. The importance of recognizing this condition early is, that while this fibrous deposit is in its embryonic state it is soft and yielding, and by the use of proper measures, such as frequent dilatation of the rectum with bougies, and the use of antisyphilitic treatment, the subsequent contraction and formation of a stricture may be prevented.

While the weight of clinical evidence supports the views expressed above, I do not think it conclusively proven that all cases of syphilitic stricture of the rectum can be accounted for by a previous ulceration of its mucous and submucous coats, or that a certain number of cases may be accounted for by the theory, propounded by Fournier in 1876, of an interstitial hyperplasia ending in a fibrous degeneration, and persistent contraction of the walls of the gut, without any previous ulceration. Tuttle ("Diseases of the Anus, Rectum, and Pelvic Colon," page 471) asserts that he is convinced from the histories of those cases of true anorectal *syphiloma* that have come under his notice, that they have been preceded by symptoms of ulceration of the mucous surface of the bowel. We are convinced, however, that when such cases are watched carefully from the time of the primary lesion ulceration of the mucous and submucous coats of the rectum will always be found to precede syphilitic stricture.

PATHOLOGY OF STRICTURE.—There is localized thickening of the mucous membrane and loss of the normal elasticity of the rectal wall, which has a dense leathery feel, and the mucous membrane is generally ulcerated. When the ulceration has healed, the mucous membrane is dry and loses its smooth, glistening appearance, which is due to the loss of its goblet-cells. When ulceration is present the surface is bathed in a

mucopurulent discharge which is sometimes sanious. In old cases, where the stricture is quite tight, there are likely to be two points of ulceration, one above and the other below the stricture. The one above, due to the irritation and pressure of fecal matter, which collects at that point, is a simple necrotic ulcer; the one below is the type that produces the stricture.

Fistulæ are frequently found beneath the mucous membrane, leading downward from the stricture, and extending outside into the perirectal tissues.

The characteristic pathological changes to be looked for in all cases of syphilitic stricture are the nodular developments about the arteries and veins, the endarteritis, and the finding of the *Spirochæta pallida*. In connection with the above findings the previous history of the patient should always be given due consideration.

Symptoms.—Passing over symptoms incident to the primary lesion which finally result in stricture, as they belong to the stage of ulceration of the rectum before treated of, I point out that not until the stenosis is well marked are the symptoms of stricture of the rectum sufficient to attract the attention of the patient, or to cause him to seek advice from his physician.

The first symptoms complained of are heaviness and weight in the rectal and sacral regions, frequent desire to urinate, and a gradual increasing tendency to constipation, with difficulty in having a stool. The gradual retention and constant accumulation of a certain portion of fecal matter that should be evacuated each day soon gives rise to irritation and subsequent ulceration of the mucous surface of the bowel above the stricture. Following close upon this, we have ulceration beginning in the mucous surfaces below the stricture, due to an impairment of the circulation by the compression of the fibrous tissue surrounding the vessels—a pressure necrosis. This ulceration below the stricture generally assumes the character of the ulceration peculiar to the primary disease. The most important symptoms attending the ulceration are a

copious discharge of thin, mucopurulent matter, frequently tinged with blood, and frequent desire to defecate, often ineffectual, resulting only in straining and the passing of some mucus and blood. It is at this stage that the physician is likely to be misled with regard to two important conditions—first, by mistaking the above symptoms for dysentery, which has frequently been done by those who have been careless enough to make a diagnosis without examination; secondly, when there is an impaction of fecal matter above the stricture, the hard scybalous masses will set up sufficient irritation to give rise to what is apparently a watery diarrhœa, whereas, in reality, the stools are only made up of an excessive amount of the mucopurulent matter, colored by erosions from the fecal masses; thus, what is apparently a diarrhœa is in reality an impaction. The characteristic symptom of the latter condition is the involuntary and constant discharge of these watery stools. One may always suspect the true nature of such a condition in connection with such a symptom, whether the accumulation is due to stricture or to simple fecal impaction. Both of these mistakes can be avoided by a careful digital examination.

With regard to mistaking the early symptoms of stricture for those of dysenteric ulceration, it is doubtless due to such a mistake that stricture of the rectum has frequently been attributed to such a form of ulceration, whereas it is very questionable if a stricture of the rectum has ever resulted from such a form of ulceration, knowing, as we do, such ulcerations to be confined to the superficial part of the mucous surfaces.

The amount and character of the discharge depends largely upon the character of the stricture. When syphilitic, the discharge will likely be very abundant, nearly always sanious, dark in color, and possessing a feculent odor. When due to simple or tubercular inflammation, the discharge is much less likely to be mixed with blood and is creamy white in color.

Inflamed tags of skin, condylomata, papilloma frequently surround the anal margin in syphilitic strictures.

The shape of the moulded stool in stricture has until recently been considered characteristic, but now it is known that its shape can only be modified by the stricture when the latter is close to the anal margin.

When the stricture involves the sphincter, the infiltration of its fibres by fibrous tissue interferes with its action, giving rise to more or less incontinence.

Dilatation and thinning of the wall of the rectum or sigmoid always occurs in the course of time just above the stricture, which, together with the ulceration previously spoken of, makes the danger from rupture of the bowel probable and calls for great care in the management of the case.

Diagnosis.—While the history of the case and the symptoms may aid materially in diagnosis, the only positive means is a digital examination when the stricture is within reach of the finger; when it is above this point, the pneumatic proctoscope, together with the proper interpretation of the symptoms, will generally be sufficient to enable the physician to arrive at a definite conclusion. Let great gentleness be exercised in examination, either with finger or proctoscope, in order to avoid risk of rupturing the diseased bowel. A bimanual examination will greatly aid the examiner when the stricture is high up, as will an examination *per vaginum* in women. All of the above means will be made much more effectual in strictures high up by the relaxing effect of a general anæsthetic.

Very little definite information can be gained by the use of rectal bougies in these cases, and when they are used the greatest care should be taken.

A former practice of introducing the whole hand into the rectum for the purpose of making a diagnosis in obscure cases cannot be too greatly condemned in these, as it offers no advantages over the methods just enumerated and is far more dangerous. When failure has attended the above methods in making a diagnosis for stricture high up in the bowel, an exploratory laparotomy for the purpose, and at the same time

for the removal of the diseased portion, is perfectly justifiable. The incision for this purpose should be similar in location to that for a left inguinal colostomy, as the latter may become the more justifiable means of relief.

The differential diagnosis between benign and malignant stricture of the rectum is very important and, in some cases, difficult. This is far more likely to be the case with strictures high up; the nodular character of the malignant growth can generally be made out when low down. The age of the patient in a measure helps to differentiate between the two, as a malignant growth does not generally occur in persons under thirty-five years of age. The latter ordinarily runs its course in the death of the patient in two or three years, and is attended with the early loss of flesh and strength. The reverse condition exists in the benign form. The discharge in malignant strictures is likely to be very offensive, and generally of a dark grumous character, and of a prune-juice color.

Whenever possible, a specimen from the growth or stricture should be obtained and examined microscopically, but not too much reliance placed upon the results, as it may be beyond the limit of the growth.

In determining between the different varieties of inflammatory strictures, the differentiation is most marked between syphilitic strictures and those due to other causes. In the former, they are rarely abrupt in making their appearance; show a gradual funnel-like contraction, and have a bluish white cicatrix around the edges of its ulcers; whereas in simple inflammatory strictures, they make their appearance abruptly, may be limited to only one side of the rectum, and are likely to occur near the anus.

The scrapings from a tubercular stricture will generally determine its character by the presence of tubercle bacilli and giant cells.

Treatment.—This may be divided into preventive, palliative and operative.

Preventive Treatment.—Of this I would say that much can be done to prevent the formation of a stricture if the case is closely watched, and the fibrous tissue kept well dilated in the early stages of its existence, best done at the close of the healing process of the primary sore, and immediately following it; hence the necessity of dilating the anal canal for several weeks from the close of the first week following all operations for hemorrhoids, or of the healing of deep ulcerations. Similarly, all cases of syphilis seen in the primary stage should have their rectum examined repeatedly during the secondary and tertiary periods, for all ulcerations should be treated promptly both by local and constitutional means to make them heal as promptly as possible, and following the healing of these ulcers the rectal wall should be dilated, probably most successfully by inflation with air every alternate day, for five or six weeks.

Palliative Treatment.—The success attending this depends upon the stage of development when it is begun. If before the fibrous tissue has become fully organized, and before it has lost its elasticity, then much can be accomplished by gradual and careful dilatation, and if syphilitic in origin, the gradual dilatation may be supplemented by antisyphilitic constitutional treatment. If, however, the stricture is hard, dense and unyielding, little can be expected from either of the above methods, though much can be done, however, even at this stage for the comfort of the patient, by so regulating his diet as to give him a soft and easy stool. Let the diet consist largely of vegetables and fruits, even at the risk of irritating the ulcerated surfaces about the stricture if they exist. The scybalous masses which are so likely to form above the stricture must be prevented, if possible, and if laxative food fails to do so, then it should be supplemented by the administration of olive oil by mouth in half-ounce doses, several times daily, either with lemon juice or in salad dressing.

ELECTROLYSIS.—Very much has been claimed for the action of electrolysis in dilating strictures and for stimulating

the absorption of the fibrous tissue. After a thorough trial of this method I found results gained in dilating the stricture to be entirely temporary, the electrode seeming to pass more easily when the current was on than when not; but repeated introductions of the olive-shaped electrode with the current did not make it pass in any easier without the current than it did before the latter was first used; nor did I find any appreciable difference at the end of several months' use of electrolysis in the amount of fibrous tissue that composed the stricture.

GRADUAL DILATATION.—Much more can be said in favor of gradual dilatation of a stricture by bougies, from a palliative standpoint, than from electrolysis, as by this means patients may frequently be enabled to keep the rectum and sigmoid emptied with considerable comfort and for some time. Do not forget that the use of this palliative means is attended with considerable risk of rupture of the bowel, hence great care should be taken in its use.

The bougie used for this purpose should be soft and fairly flexible, the Wales type being the best on the market. Use great gentleness and little force in its introduction, and it is best to have the different sizes, certainly from No. 4 to No. 10, in order that you may not be tempted to introduce a No. 8 bougie into a stricture with the calibre of a No. 5. Let the bougie be introduced every day, or every alternate day, and remain in the stricture from five to ten minutes each time.

Stricture situated below the deflection of the peritonæum (that is, within five inches of the anal orifice) is best adapted to the use of this palliative measure, as the danger from rupture of the walls of the bowel below that point are not nearly so serious. I would not advise the use of a bougie for gradual dilatation of a stricture above this point, except in the hands of the most experienced operators.

In cases of stricture of the anal orifice, especially those following operations for hemorrhoids, I recommend the olive-shaped, hard-rubber dilator, which comes in four sizes, No. 1

being the smallest. The No. 3 is as large as will be found necessary (Fig. 110). They can be used by the patient without any risk, after having been instructed by the physician.

RAPID DILATATION.—In the light of present experience, it would be only safe to use this means in cases of stricture well below the deflection of the peritonæum, especially those following operations for hemorrhoids. It should always be done under the influence of a general anæsthetic. There have been many devices suggested in the way of rectal dilators, such as Sims's, Durham's, Mathews's, Martin's " coactor," and several others, but I advise that any stricture of the rectum that contains more fibrous tissue than can be stretched or torn with the fingers, or a Kelly dilator, be cut with a knife.
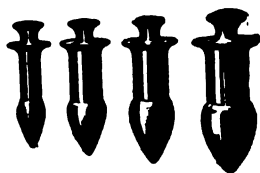
FIG. 110.—Olive-shaped hard-rubber dilators.

OPERATIVE TREATMENT.—The operative methods that are generally suggested for the relief of stricture are partial and complete proctotomy, colostomy, and excision.

Partial Proctotomy.—Partial or internal proctotomy may consist either in nicking the margins of an annular stricture, or of an internal complete division of it. The former is quite simple and devoid of any special risk, but the latter is very dangerous on account of the liability to infection, especially if the stricture is located high up in the rectum, and unless complete drainage with frequent irrigations can be secured. I do not advise the latter procedure except in cases of valvular stricture, after which a drainage-tube should be kept in the rectum and the same irrigated at least twice daily.

Complete Posterior Proctotomy.—This consists of an incision from just above the stricture, through the stricture, and continued through all the coats of the bowel including

the sphincters and tissues posteriorly to within a short distance of the coccyx. By keeping the line of incision in the posterior median line there will be very few of the fibres of the external sphincter cut. Before this incision is made the rectum below and if possible above the stricture should be thoroughly irrigated with an antiseptic solution, preferably 1–1000 of bichloride of mercury. After the stricture and the tissues between it and the coccyx have been divided, a No. 10 or No. 12 Wales bougie must be passed well up into the sigmoid to assure the operator that there is not a second stricture higher up, a possibility to be borne in mind. When there are fistulous tracts running around the stricture, opening either above or below it, open them all up, and incise the stricture at the same time. This may serve the purpose of a posterior proctotomy. Following the operation the wound must be well packed with plain sterile or iodoform gauze, a drainage-tube having first been placed in the rectum, with its upper end several inches above the stricture, and its lower end protruding several inches beyond the anal margin, and this kept in from thirty-six to forty-eight hours. Let the removal of the first packing be followed by irrigations of sterile water twice daily, with light packing, the large drainage-tube still remaining for several days. After this, take out the drainage-tube and packing and irrigate the wound with sterile water twice daily, and pass a No. 10 Wales bougie into the bowel after each irrigation, allowing it to remain for five minutes each time. Continue this treatment until the posterior wound is closed completely, after which the Wales bougie should be passed once a day for a year following, or as long as there is any tendency to contraction of the rectum.

There is some danger of infection following this operation, which should be met promptly by immediately removing the packing and instituting frequent, warm, antiseptic irrigations. Should the hemorrhage be excessive, immediately after the operation, it can be controlled best by packing the wound tightly.

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This method, although not curative in its results, may be found very useful in allowing the patient to have fairly satisfactory evacuations, as long as he will persist in the regular passage of the bougie at the regular intervals. It is only applicable to those cases where excision is contraindicated, and where the stricture is within five inches of the anal margin.

Colostomy.—Colostomy may frequently be employed in cases of stricture of the rectum for the following purposes: to insure a more thorough irrigation of the ulcerative bowel below; for temporarily diverting the fecal current, thus relieving the ulcerated bowel from the irritation incidental to its passage over it; or as a permanent artificial anus; and in cases of tight inoperable strictures of the rectum for temporarily diverting the fecal current preceding and immediately following an excision of the rectum. For either of these objects, left inguinal colostomy will be found very useful, and should be used much more frequently than it has been for these cases.

Excision.—Excision of rectal strictures is only applicable to appropriate cases. Do not let it be done in cases attended with extensive ulceration of the mucous membrane, or with suppurating fistulous tracts. The technic of the operation should be most complete, as success so largely depends upon this. The sigmoid and rectum must be emptied by gentle means, three or four days before the operation is undertaken, and for the same length of time the evacuations should be followed by frequent irrigations with antiseptic solutions, preferably 1–5000 of mercury bichloride. The excision may be done by one of two methods, either the perineal or the sacral, the choice of which depends upon the location of the stricture. If the stricture is within 2⅜ inches of the anal margin, the perineal route is to be chosen; if above this point, the sacral one.

Perineal Method.—If the sphincters are involved in the stricture, dissect them out, together with the rectum, by an incision extending entirely around and to a point at least two

inches above the stricture. If the sphincters and anus are not involved, a posterior proctotomy may be done, the incision extending up the rectum to a point just below the stricture. A circular incision is now made on the inside of the rectum, just above the internal sphincter muscle, and extending through all the coats of the bowel. The rectum is dissected out to a point two inches above the stricture, as in the previous case, and cut off just above the stricture, its proximal end drawn down, and stitched to the border of the mucous membrane that was left just above the sphincters. The cut ends of the sphincter, divided in the posterior proctotomy, are now drawn together, its mucous edges being first united, and then the sphincter and the adjoining tissues are approximated and held in place by two deep silver-wire sutures. The posterior proctotomy wound is drawn partially together, and a drainage-tube and some slight packing are put in the lower angle of the wound and allowed to remain for several days, until there is evidence of union having taken place between the cut ends of the bowel. A large piece of rubber tubing is now introduced into the rectum for three or four inches, and allowed to protrude beyond the anal margin for the purpose of carrying off the gases and fecal matter from above, without infecting the wound. Let the bowels be confined for six or seven days with opiates, if necessary, and the patient put on liquid diet. If impossible to secure a sufficient length of bowel to pull down to the anal margin after excising the strictured portion of it, then you are justified in cutting the lateral ligaments opening into the peritoneal cavity and dividing the mesorectum sufficiently far up to allow the bowel to be drawn down and attached just above the anal margin. This latter procedure is not likely to be necessary in the cases that call for the use of the perineal route.

The Sacral Method.—The sacral method is similar to Rydgier's modification of Kraske's operation for excision of the rectum, hereafter to be described under Extirpation of the Rectum.

Here is a case of excision of the rectum by the perineal method taken from my own case-book. It is a forcible illustration of extensive tubercular infiltration, and the good results obtained in this case show that such cases are not as hopeless as generally supposed; on the contrary, the very presence of such an amount of fibrous tissue as to cause stricture is evidence of the successful resisting power of the individual against the disease. Whenever there is extensive infiltration surrounding tubercular inflammatory processes, such cases offer the best results from operations, provided such barriers are not broken down, unless the entire diseased tissue can be taken out without the risk of infecting the surrounding healthy tissues, as in carcinoma.

CASE.—General history, from the family physician, Dr. Henry J. Hahn: R. F. W., came to me for treatment July 2, 1908. Complained of having felt sluggish and feeble for several weeks. He thought he had malaria. Physical examination showed no liver or splenic enlargement, and the examination of the abdomen was negative. Lungs were clear, except for rough breathing over the left apex anteriorly and posteriorly, with prolonged expiration. Temperature reached its maximum, 101.5, on July 5, three days after I saw him, then it cleared up by lysis, and was normal within ten days from the onset. There is no cough now, only occasional clearing of the throat.

He gave a history of having had a cough about eight years ago, which lasted for more than six months. This was followed a year later by an attack of purulent tonsilitis, the abscess rupturing spontaneously. About that time he lost fifteen pounds in weight, which he never regained up to the time of the operation.

When the diagnosis of tuberculosis of the rectum was made I began the injection of tuberculin, using Koch's T O, beginning with a dose representing .001 mg.; this was increased daily until he is at present taking 50 mg. without reacting.

Examination of the lungs December 1, 1908, showed the same to be clear throughout. He has increased in weight thirty pounds.

Special History.—About ten years ago his hemorrhoids were injected by a quack, presumably with a solution of carbolic acid; this was followed by excruciating pain and considerable swelling, which only subsided after several weeks. About one year afterward he was operated on by a general surgeon for stricture of the rectum, who did what appeared to be, from the scar tissue, a posterior proctotomy. Since that time the constriction has gradually increased until the lumen of the bowel at this point is only about half an inch in diameter. The most contracted portion of the rectum is about three inches from the anal margin, with the infiltration of the tissue growing less until it gradually disappears about one inch below the stricture. There are frequent attempts at stool, followed by the passage of a small amount of fecal matter, with considerable mucus, sometimes streaked with blood.

Operation.—Under ether anæsthesia I operated by the perineal method. First, an incision was made posteriorly from just above the stricture through the sphincters at the posterior commissure down to the tip of the coccyx; a circular incision was then made through the entire thickness of the bowel, entirely around the rectum just above the internal sphincter; the rectum above this point was then dissected out to several inches above the level of the stricture. The resected portion of the rectum was now excised at a point just above the level of the stricture, and the proximal end of the bowel drawn down and sutured with chromicized cat-gut to the mucous membrane, which had been left by the first circular incision covering the sphincters. The ends of the divided sphincter at the posterior commissure were brought together and sutured, first, with chromicized cat-gut, and these reinforced by a deeper silver-wire suture. The incision in the tissues, between the sphincter and coccyx, was left open to heal by granulation, and drainage-tubes were introduced through this incision on either

side of the rectum; there was also a drainage-tube introduced anteriorly to the excised portion of the rectum wall. The latter was removed in three or four days, and the posterior tubes after a week or ten days. The results were all that could be desired, the proximal and distal ends uniting very promptly, and the posterior incision in about one month. There was very slight separation between the divided ends of the sphincter ani, not more than is generally found following an ordinary operation for fistula in ano, and he has perfect control over normal stools. Up to the present time, eight months from the date of the operation, there is not the slightest tendency to a recurrence of the stricture.

The Gross Condition of the Specimen.—The length of the excised portion of the rectum was about three inches, and the infiltration was very extensive, including all the coats of the bowel, and also extending to a limited extent into the cellular spaces beyond. The naked-eye appearances were similar to those of syphilitic infiltration.

Pathological Findings.—The examination of the specimen was made by Dr. Jose L. Hirsh. Here is his report:

Examination of the tissues shows several areas of beginning caseation, and others with rather well-formed early tubercles; other areas show considerable increase in fibrous elements. I take the condition to be tubercular stricture of the rectum.

Results.—The results of this operation are not nearly so good as hoped for in the early days immediately following its introduction to surgery. The hopes of the early operators had been raised by a comparatively small mortality, about 10 per cent., but a longer observation of the cases showed a very large percentage of recurrences, almost as large in proportion as in complete proctotomy; besides there were quite a number of other very unfortunate sequelæ, such as incontinence, prolapse, rectitis, and suppuration sufficient for them to wear napkins; and stercoral fistula. A still more extended observation of these cases will probably warrant the statement,

that, barring a certain amount of inconvenience due to ulceration, small fistulæ, or incontinence, 50 per cent. of these cases have been practically cured. These results show a decided improvement over the older methods of treating stricture by internal and complete proctotomy.

PROCTOPLASTY.—This is the effort to restore the normal condition of the margin of the anus, and the lower portion of the rectum, following great destruction of the tissues of these parts, which has been followed by large, dense cicatrices. It may be impossible to restore the calibre of the rectum, or the anal outlet, without resorting to some form of plastic operation. No rule can be laid down for such work, but it will have to be left to the ingenuity of the attending surgeon to meet each case on its individual requirements.

There have been cases reported where such defects have been corrected by taking large, triangular flaps from the buttock, swinging them around into the space from which an extensive cicatrix has been removed, and suturing in this position. Skin-grafting has also played an important part in the restoration of these cases.

CHAPTER XIII

PRURITUS ANI

IT must be remembered before undertaking the consideration of this subject that pruritus ani is a symptom, not a. disease. Broadly speaking, it may be said that pruritus or itching is due to an irritation, either direct, reflex, or constitutional. We will consider the part played by each one of these causes, and try to determine which one, if any, plays the most important part and is most causative in producing these symptoms. I do not doubt that constitutional causes may, in a certain number of cases, be a predisposing and in a certain very limited number the sole etiological factor, yet I think very few cases can be accounted for on such grounds. Among the constitutional causes are gout, uricæmia, and diabetes.

REFLEX CAUSES.—Reflex causes are those that result from an irritation that has been reflected from some other organ. The intestinal tract and the genito-urinary organs are most frequently at fault in these cases. I am sure pruritus ani much more frequently results from this class of causes than from the preceding or constitutional ones. Dismissing then further consideration of these two with the injunction that if no local cause for the symptoms can be ascertained after most careful and painstaking search (not complete without being made under the influence of a general anæsthetic), then the above possible causes must receive due and careful consideration.

I know that in the large majority of cases a local cause can always be found to account for the symptoms, this view being so strengthened by each year's additional experience that I now feel justified in taking such a decided stand in asserting that there are but few exceptions to this rule.

DIRECT CAUSES.—These may be divided into external and internal.

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External causes are such as affect the skin surface around the anal margin as far as the mucocutaneous border. Under this heading may be included pediculi, parasites, eczema, dermatitis, herpes, and erythema. The form of pediculi that are most likely to infect the anal border is the *Phthirius inguinalis,* or crab-louse. They can readily be gotten rid of by a liberal use of blue ointment or coal oil. Of the visible parasites that produce itching around the anus the *trichophyton* is the one most commonly found. This parasite is the cause of eczema marginatum. It is found in the superficial layers of the epidermis and is said to be highly contagious. A microscopic examination will always disclose its presence. The characteristic appearance of the fungus is that it contains very numerous spores or mycelia. The most satisfactory and certain remedies for their destruction, and at the same time to allay the itching, are ointments containing about 2 per cent. of acid salicylic and 3 per cent. of Calvert's carbolic acid.

Herpes around the margin of the anus is not nearly so likely to produce pruritus; it is readily recognized, and its treatment has already been alluded to.

We believe that by far the most frequent local cause for pruritus ani is to be found in blind sinuses frequently originating in ulcers at the bottom of the crypts of Morgagni. The likelihood of small, hard foreign bodies getting into these crypts and resulting in irritation and ulceration is very great, on account of their location, between the columns of Morgagni, with the open end of the crypt looking upward. This blind sinus may burrow in the tissues beneath the mucous and cutaneous surfaces of the anal canal and extend entirely around it, frequently with no evidence of any external opening. On account of the excessive moisture of the skin around the anal margin, which is so frequently found, especially in those cases where cracks and fissures are found between the anal folds of the skin, I am tempted to think that the blind sinus may sometimes relieve itself of its discharge through these cracks and fissures. I have been forcibly impressed

recently by the frequency with which this blind sinus is found after a careful search. It may be found either by introducing a probe with its end bent at an acute angle into the crypt, as suggested by William Beach, of Pittsburg, in his paper on pruritus ani, read before the American Proctologic Society, June, 1909; or by a lateral incision, made through the skin and subcutaneous tissues just beyond the anal margin, and over the external sphincter muscle. A director or probe may be introduced through the incision, and the sinus felt for, and, if present, it can be followed to its internal opening at the bottom of the crypt. The author has had more success in tracing them in this manner than by that suggested by Beach.

Charles Frederick Wallis, of Charing Cross Hospital, London, was probably the first to call attention to this factor in the etiology of pruritus ani, and T. C. Hill, of Boston, and William M. Beach, of Pittsburg, have since expressed similar views.

Among the other local causes may be mentioned anorectal ulcerations, hemorrhoids, catarrhal conditions of the rectum and lower sigmoid, irritating vaginal discharges, thread-worms, congestion resulting from habitual constipation, the presence of smooth foreign bodies in the rectum, tumors of the rectum, and even of the adjoining organs. Thomas Cullen, of Johns Hopkins Hospital, Baltimore, cites a case of a very aggravated pruritus ani, which had lasted for some time and had resisted all forms of treatment, which was finally relieved promptly and permanently by the removal of a fibroid of the uterus.

The dry, brittle condition of the mucocutaneous surface about the anal margin, frequently described as a symptom of pruritus ani, is associated with atrophic catarrh of the anus and rectum, while the moist, sodden, whitish condition of the skin around the anal margin is found in those cases due to blind sinuses.

Symptoms.—The symptoms may almost be summed up in one word, itching, which predominates so largely over all

others that they are literally lost sight of. The itching is of a most tormenting and tantalizing character, in some cases almost driving the patient to distraction. It is generally worse at night, coming on after the patient is warm and comfortable in bed, although others are subject to it both night and day. In some it is produced by sudden changes of temperature, overwork, and anxiety. The skin surrounding the anus is commonly thickened, of a whitish appearance, or, in certain cases, as in those resulting from atrophic catarrh or syphilis, it is dry and scaly; in either case sulci between the furrows

Fig. 111.—Showing the thickened and cracked skin in pruritus ani.

of the skin are cracked, and in the first class of cases exude a thin, clear, watery discharge. In either case the skin for some distance around the anal margin is denuded in numerous places by the finger-nails of the patient, giving it a blotched or barked appearance (Fig 111).

Treatment.—The remedies that have been suggested for the relief of the itching are innumerable, as have also been the surgical procedures, but we think since a local cause is so generally recognized the treatment hereafter will consist in a thorough search for and removal of it, without wasting so much time in the trial of the numerous remedies.

The author thinks it best in the chronic cases, especially those attended with thickened and fissured skin, for the attending physician to tell the patient from the very first how little hope there is for any permanent relief in local applications, and advise him to submit to a thorough search for the cause, under a general anæsthetic if necessary, and at the same time to have it removed if found. This recommendation would include the search for and the opening up of blind sinuses or fistulæ, the removal of hemorrhoids, polypi, condylomata, the division of stricture, or the removal of any pathological lesion or foreign body that may be found. If intestinal parasites are suspected, they should be removed by means recommended in books on general medicine. A very simple remedy for the removal of thread-worms, as suggested by James P. Tuttle, is the injection into the rectum and drinking of liberal quantities of lime-water.

When evidences of a reflex cause exist, it should be corrected at once, and while waiting for such a cause to be removed one of the local remedies hereafter to be recommended for allaying the itching should be used.

When due to catarrhal proctitis or sigmoiditis these diseases should be treated according to the directions before given in the chapter on those diseases.

LOCAL APPLICATIONS.—For allaying the pruritus, I give only such remedies which I know to be of special benefit. I have already mentioned those to be used in cases due to pediculi, eczema marginatum, and trichophyton. In the following prescription it is recommended that Calvert's No. 1 carbolic acid should always be specified, as it has been found that other preparations of it are irritating to the skin:

> ℞—Acid carbolic C. No. 1............ gtt. xv
> Pulv. gum camphor.............. ℥ss
> Spr. rectificat. .... q.s.
> Ungt. zinci oxidum .... q.s. ℥ss
> M. ft. ungt.
> S. Apply before going to bed, and whenever necessary to allay itching.

R—Pulv. camphor .... ʒss
    Spr. rectificat. .... q.s.
    Ungt. aq. rosæ .... ʒss
    M. ft. ungt.
  S. Apply whenever itching.

Lewis H. Adler, of Philadelphia, is very partial to the use
of the ointment of the nitrate of mercury, in strengths varying
from 10 per cent. to the pure ointment.   He advises this as a
curative measure to be tried in all chronic cases where no local
cause can be found, or when no relief is given by their removal.
He insists upon the application of the ointment daily by the
physician himself, following the evacuation of the bowels.
The parts should be thoroughly cleansed by him, the ointment
spread upon gauze and applied to the parts and held in posi-
tion by a T bandage.

If the pure ointment produces much irritation, it is reduced
in strength.   Another very good application is the following:

R—Chloral hydrate .... gr.xv
    Glycerina .... ʒss
    M. ft. mixture.
  S. Apply when the parts are itching.

Sometimes the application of comp. tr. benzoin, to be re-
peated whenever necessary, will afford relief.

In cases where no exciting local cause can be found, and
which have resisted all local treatment, Sir Charles Ball (*Brit-
ish Medical Journal,* Vol. I, page 113, January, 1905) has
recommended the division of the sensory nerves supplying the
affected parts, which is done under the influence of a general
anæsthetic in the following manner: An elliptical incision is
made on either side of the anus, about one-half to three-
quarters of an inch from its margin, the incision beginning on
either side of the perineal raphe, and being continued around
the anus, to the coccygeal raphe.   The incisions on each side
are elliptical in shape, and do not meet anteriorly or posteriorly
by at least three-quarters of an inch (Fig. 112).   The inci-

sion extends through the skin into the subcutaneous tissue. On
both sides of the elliptical incision the skin is separated from
the underlying tissues by blunt-pointed scissors, for one inch
on the peripheral side, and to the mucocutaneous junction on
the proximal side, also beneath the underlying flaps of the
perinæum both anteriorly and posteriorly. In doing this all
the sensory nerves supplying the parts are divided (Fig. 113).
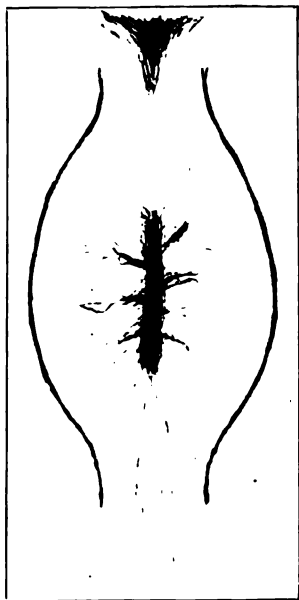
FIG. 112.—Showing elliptical incisions
each side of the anal margin.

FIG. 113.—Showing one flap dissected
back, which brings into view the nerve fila-
ments to be divided.

All the flaps are now allowed to fall in place, and their edges
are stitched together with interrupted cat-gut sutures. A
compress is applied, which is renewed twice in twenty-four
hours, the wound being first sponged off with a weak solution
of bichloride; the patient is confined to bed, and the bowels
are confined until the fifth or sixth day. By this time union
of the parts should have taken place, when the itching will be

found to be relieved in a large majority of cases. I personally have done this operation a number of times, with about 75 per cent. of cures.

Thomas C. Martin, of Washington, D. C., who has suggested a modification of Ball's operation, has had even better results; a number of others equally good ones. This operation should be done under strictly antiseptic precautions, so as to secure primary union of the wound. Martin's modification of Ball's operation consists in the interruption of each of the lateral elliptical incisions at their centre, leaving a connecting link between the internal and external flaps.

Louis J. Krouse, of Cincinnati, Ohio, suggests still another modification of Ball's operation, giving the following reasons:

" In order to derive the full benefit of Ball's original operation, and still maintain the vitality of the flaps, it is imperative that the flap dissected from the underlying tissue should receive its blood-supply from the vessels coming from the skin, and that the circulation should be as abundant as possible. This can be accomplished by loosening the skin of the anus in a different manner. The method I suggest is somewhat different from that proposed by Mr. Ball or Dr. T. C. Martin, and consists (1) in doing away with the elliptical incisions which cut off the greater part of the circulation from the diseased area; and (2) in making six or eight linear incisions through the skin into the subcutaneous connective tissue. These linear incisions, beginning at a point outside of the point of irritation, follow the course of the radii of a circle whose centre is the anal canal. The skin-flaps lying between the adjacent radii are then undercut until the whole affected area is undermined and separated from the subcutaneous tissue, thus dividing all nerve filaments. Should the dissection be difficult, and more room be needed, then every alternate flap could be loosened at the anal margin, and dissected outward toward the periphery. After all adhesions are loosened and the bleeding has been stopped, the parts are again replaced and sutured (Fig. 114).

" The advantages of this operation over the original one of Ball lies mainly in the better nourishment of the flap. The blood must come from the circumference and must radiate toward the anal canal. In the original operation of Ball it enters only through the two pedicles of the skin attached to either extremity. In the operation that I propose the blood comes from the periphery—from the entire circumference of
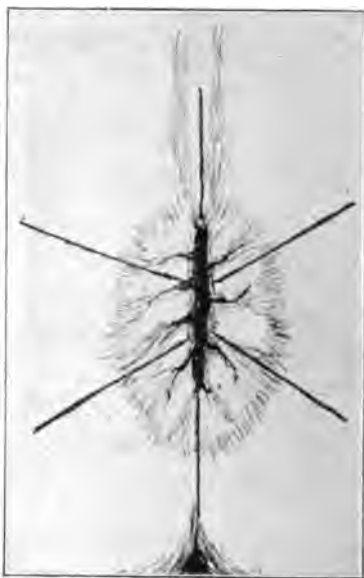
FIG. 114.—Showing Krouse's radial incisions, between which the skin and subcutaneous tissue is to be dissected from the underlying tissue.

the flap. It is more direct in its course, it is closer to its source of supply, and its quantity is more abundant. The vitality of the flap is therefore better assured."

The author has recently been convinced that the success following Sir Charles Ball's operation and its modifications has been due to the fact that in cutting loose the skin from the subcutaneous and submucous tissues the fistulous tracts are opened up and subsequent healing of the tracts follows. For the past year I have treated all such cases by finding,

opening up and tracing these sinuses to their internal openings. Recently I had one case in which there were four internal openings, all of which were opened up. They were very superficial, as they generally are, and did not involve the sphincter muscle. I dealt with them as ordinary fistulous tracts after the operation, making them heal from the bottom; so far I have not had a single case where the procedure failed to relieve the pruritus ani. The following case will serve as illustration:

CASE.—W. B. presented himself for treatment for pruritus ani at St. Joseph's Hospital, September 11, 1909. I found it to be the same case from which I had removed a number of hard papillomas August 3, 1908. Upon examination it was found there had been no return of the papillomas, but there was a thickened fold of skin across the posterior commissure, and above the skin scar tissue which extended up to the upper border of the internal sphincter, directly beyond which I found an opening to a blind sinus, which ran downward and outward to the external anal margin, where it bifurcated and a fistulous tract ran on each side, just beneath the skin nearly to the anterior commissure. These tracts were opened up and left to heal by granulation. So far as I have been able to learn, the patient has been entirely relieved of the pruritus ani. I am convinced now that the hard papillomas removed from this patient a year previous were caused by the irritating discharge from these blind sinuses.

X-ray and High-frequency Current.—Within the last few years these measures have been used with varying degrees of success, but on the whole results have not been sufficiently encouraging to warrant more than a trial in those cases that have resisted other forms of local treatment before subjecting them to operative measures.

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CHAPTER XIV

COLOSTOMY

COLOSTOMY.—The formation of an artificial anus by an opening into the colon.—*Gould.* This definition is applicable to any portion of the colon and is intended to be applied to a permanent opening for the purpose of diverting the fecal current, whereas the term colotomy, which for the last two centuries was applied to this operation, means only a temporary opening into the colon for any purpose (the removal of foreign bodies, etc.), after which the colon is immediately closed.

Colostomy is, therefore, applied to any form of opening into the colon that is to be used for the purpose of an artificial anus, whether temporary or permanent.

Temporary colostomy is now employed very frequently in the treatment of various diseased conditions of the rectum, sigmoid, and colon, as a preliminary operation to extirpation or resection of the lower end of the intestinal tract, in imperforate ani, in complicated fistulæ between the intestine and urinary organs, in certain types of prolapse, and in strictures of the sigmoid and rectum.

Permanent colostomy is employed in inoperable strictures and in neoplasms of the lower part of the intestinal tract, in cases in which it is impossible to re-establish the continuity of the intestinal tract after resection of the diseased portion, or where the sphincters and entire anus have been removed in amputating the rectum for malignant disease.

Since surgeons have made such frequent use of colostomy for temporary purposes they have modified the former technic with special reference to closing the artificial anus readily and without having to resect the bowel or even to enter the peritoneal cavity.

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The operation of the present day is confined almost entirely to the abdominal route. Lumbar colostomy has been abandoned almost entirely, except in those cases where the disease involves the descending colon, or where there is an abnormally short mesocolon, or where the descending colon is so bound down by adhesions as to make it impossible to draw it out through the abdominal wound, and even in such cases the majority of surgeons would prefer tapping the transverse colon from in front.

With the modern technic properly carried out, the mortality from this operation by the abdominal route is practically *nil*, except in those cases of complete obstruction of the bowel and where operation has been too long delayed.

Lumbar colostomy having now become obsolete, its technic is not here given, but I refer the reader to previous works on diseases of the rectum and anus.

There are certain general directions or rules to be followed in the selection of the locality at which the colon should be opened. There are three localities from one of which the selection is generally made, (1) the *left inguinal*, (2) the *transverse*, and (3) the *right inguinal*. The selection of one of these three depends upon the location of the disease. The opening should be sufficiently far above the disease not to be involved by it. Conversely, however, the artificial anus should not be placed farther above the diseased portion of the bowel than is absolutely necessary, because the farther above the normal anus the more fluid the stools, and the more fluid the stools the more likely the patient is to be annoyed by fecal incontinence.

Left Inguinal Colostomy.—Left inguinal colostomy consists in opening the abdomen in the left inguinal region, pulling a portion of the sigmoid or descending colon out through this opening, suturing it to the side of the wound, and opening it. This may be made either a permanent or a temporary opening.

PERMANENT LEFT INGUINAL COLOSTOMY.—This is the most common form of an artificial anus, and when, therefore, the term colostomy is used without qualification, the permanent variety is implied. It is just possible, however, that the disease for which the permanent colostomy is performed may so unexpectedly improve under the new conditions that the artificial anus may be closed; such a possibility, therefore, should always be borne in mind, and such measures taken in performing the operation as will enable the operator to close the artificial anus, without doing a resection or opening up the peritoneal cavity. Even though the artificial anus has been used for several years, the sigmoid and rectum below the opening do not become atrophied, as was once supposed.

Technic.—Let the abdomen of the patient be prepared as for any other abdominal operation. He is placed flat upon his back on the table, and a general anæsthetic administered unless contraindicated, when it may be done under a local anæsthetic (as hypodermic injections of a weak solution of cocain, $^1/_{10}$ of 1 per cent.).

An incision from two to three inches long is made, about two inches to the inner side of the left anterior superior spine of the ilium and one inch above it; and this incision should cut at right angles an imaginary line drawn from the left anterior superior spine of the ilium to the umbilicus (Fig. 115). With one stroke the incision is carried through the skin and subcutaneous fat down to the fascia that separates it from the muscle. The fibres of the muscle must be separated and not cut, each in the order in which they are exposed, the external oblique, whose fibres run downward and inward, the internal oblique, whose fibres run downward and outward, and then the *transversalis abdominis,* which takes a transverse direction. After separating the fibres of the latter, the transversalis fascia is exposed and split. The incision is now carried through the subserous areolar tissue to the peritonæum. The muscle-fibres are held apart by retractors, as each layer is separated. Spurting vessels are ligated, all oozing is stopped

by hot gauze compresses and the wound made perfectly clean before opening the peritonæum.   The patient's position should now be changed from that of prone to that of the Trendelenburg posture.   This will cause the small intestine and omentum
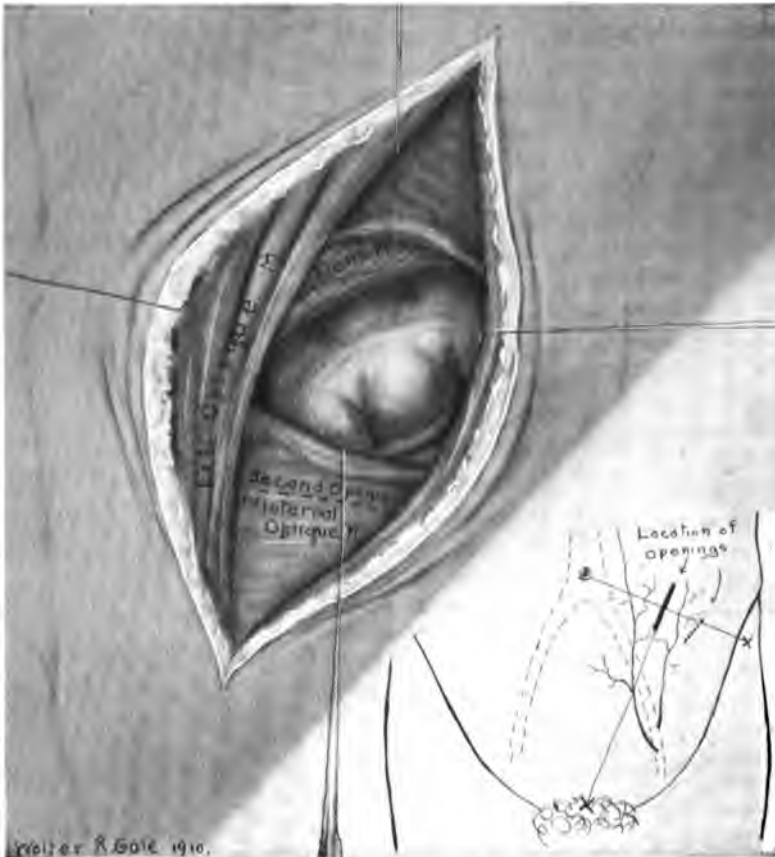
Fig. 115.—Inguinal colostomy—first step.   Diagram locating surface openings.

to gravitate to the upper part of the abdominal cavity.   The peritonæum is divided between two forceps, after which the incision is enlarged, using the finger as a guard to protect the intestines beneath.   The index finger may now be introduced

through this opening toward the median line, carrying it down
until it touches the vertebra, when it is swept outward and
upward until it is brought to the surface, which will generally
bring with it the descending colon, this being readily recog-
nized by its size, the longitudinal muscular bands, the saccula-
tions and appendices epiploicæ. Should there be any difficulty
in hooking up the descending colon with the bent index finger,
it may be inflated with gas through the rectum, or, should
this fail, the incision may be enlarged sufficiently to introduce
the whole hand in order to trace the bowel down from above,
or up from the pelvis. If the small intestines or omentum
should protrude from the abdominal wound, they may be held
in place by a large pad of gauze. When the loop of the sig-
moid is brought out through the wound, it should be examined
thoroughly to see if it is involved in the disease, and in order
to note especially the length of the mesocolon, which has to
be of normal length in order to carry out the following sug-
gestions for permanent colostomy.

To be able to obtain a certain amount of sphincteric con-
trol over the discharges from the bowel, it has been recom-
mended by Tuttle to pull down the lower fibres of the external
oblique and afterward the fibres of the internal oblique
laterally for three-quarters of an inch (Fig. 116). The skin is
separated from the external oblique downward for about two
inches, where an opening is made through the skin, just above
Poupart's ligament, large enough to pull through it the loop
of the sigmoid. The loop of the sigmoid is now drawn out
through the first incision for two or three inches, and a tape
passed through a slit in the mesocolon beneath the centre of
the loop, the ends of the tape are brought round the bowel,
are left long and clamped with catch-forceps. A pair of long
dressing-forceps are passed through the second opening in the
skin through the canal between the skin and external oblique
muscle; then through the fibres of the latter and the slit
between the internal oblique fibres. The ends of the tape
which are around the bowel must be caught, pulled through

the canal and out through the second opening in the skin, the loop of the sigmoid being made to follow it, using due care that the bowel is not injured by the traction (Fig. 117). A glass or hard-rubber rod about six inches long is now passed through the opening in the mesentery made for the tape for the purpose of making an acute spur and for holding the loop of the sig-

FIG. 116.—Inguinal colostomy—second step, showing the fibres of the external and internal oblique muscles drawn down and stitched.

moid in that position. The first abdominal wound is now closed, cat-gut sutures being used for the deeper layers and silkworm-gut for the subcutaneous sutures. The wound is sealed with collodium and dressed with sterile gauze, over which a layer of protective tissue is placed, and sealed to the skin with chloroform in order to protect it from infection when the bowel is opened at the lower incision. The protruding loop of the

bowel is left unopened from twenty-four to forty-eight hours, unless an emergency requires it to be opened sooner. It is also covered with rubber protective in order to prevent the gauze from adhering to its serous coat, after which the gauze dressing is applied, and kept in place by an abdominal binder or adhesive strips. The bowel is opened at the time decided upon by a simple incision in the line of the longitudinal fibres

Fig. 117.—Inguinal colostomy—third step.

of the bowel. After two or three weeks the protruding portions of the bowel around this incision should be trimmed down flush with the surrounding skin. The bowel may be cut across, leaving the two ends protruding as in Fig. 118. In the majority of cases the patient will soon gain control over his fecal discharges through the sphincteric action of the external and internal oblique muscles, but if these should fail then a truss with a compress may be applied between the protruding end of the bowel and the first incision, which will give the

patient almost perfect control. It will be found that the position of this opening is most convenient for the personal supervision of the patient. A combination compress and a small receiver for the discharges from the bowel has been devised by the Charles Willms Surgical Instrument Company, Baltimore, Maryland, which the author has found to be very serviceable (Fig. 119).
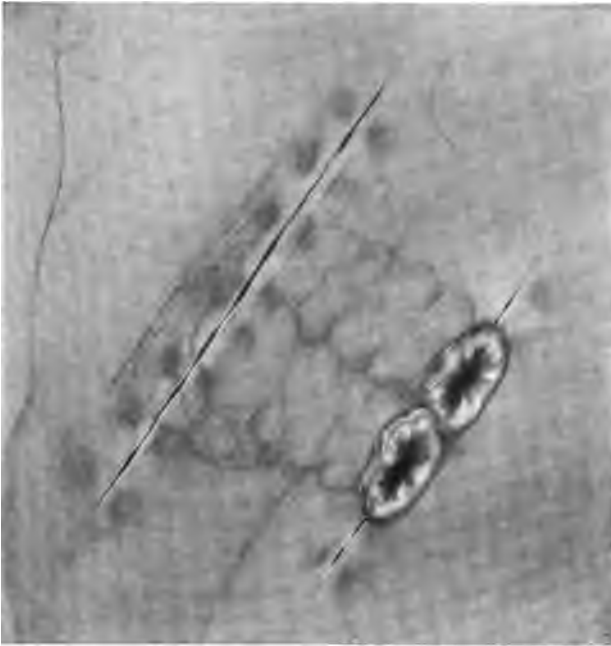
FIG. 118.—Inguinal colostomy—completed.

TEMPORARY COLOSTOMY.—The method employed for a temporary colostomy is exactly similar to the one just described for permanent colostomy, to the point of drawing out the loop of the sigmoid through the first incision. The loop of the bowel is to be drawn taut from above downward and sufficiently out of the incision to allow a glass or hard-rubber rod, from six to eight inches long, one-fourth inch thick, to be

passed through the mesentery beneath the loop of the colon, this for the purpose of making a sharp spur, and for holding the bowel in this position. If the abdominal incision is found to be unnecessarily long, the ends can be drawn together with cat-gut sutures, leaving only sufficient room for the protrusion of the bowel. The bowel is now covered with rubber protective, then with gauze, which is held in position by adhesive strips, and the bowel left unopened as previously recommended for permanent colostomy.

When the time for opening the bowel has arrived the incision for a temporary colostomy is begun at the upper angle of the wound in the abdominal wall, and is carried downward, following the longitudinal fibres of the bowel to

FIG. 119.—Compress and receiver for inguinal colostomy.

a point just beyond the rod that has been passed through the mesentery. A transverse incision is now made, covering about two-thirds of the circumference of the bowel, which cuts the longitudinal incision at right angles, forming a T-shaped incision. In this instance the flaps of the bowel are rolled back on either side, but not trimmed off, so that they may be utilized subsequently when closing the artificial anus.

Let the patient be confined to the recumbent posture for ten days or two weeks, and the diet for the first few days should be soft or liquid until the bowel is opened. For the first few hours it may be necessary to give an opiate to allay pain, but avoid this if possible, as it tends to increase the amount of gas in the bowel, which is likely to be annoying until the bowel is opened.

The rod should be kept under the bowel for at least two weeks, and the ends of it wrapped with strips of gauze to prevent irritating the abdominal wall. I decidedly prefer the rod to the suture of carbolized silk as recommended by Allingham, because the former does not allow any sagging and keeps a sharp spur.

In case of an alarming distention of the bowel by gas or fecal accumulation making it necessary to open the bowel at once, this may be done by first putting a circular purse-string suture around the portion to be opened. Then, by using a loop of the purse-string suture on one side and the two ends of it on the other to raise that portion of the bowel up, a crucial
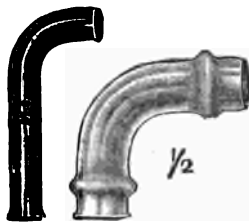
Fig. 120.—Paul's intestinal tubes.

incision is made in the bowel within the radius of the purse-string suture. A Paul tube (Fig. 120), which has a double flange at the end to be introduced, is now introduced into the opening of the bowel, and the purse-string suture is drawn around it between the flanges; a long rubber drainage-tube is attached to the distal end of the tube, and the fecal matter is thus drained off into a vessel provided for the purpose. As Gant has pointed out, the opening of the bowel before adhesions have formed should only be done in extreme cases, as he has found the mortality to be much higher than when it is opened from thirty-six to forty-eight hours afterward.

In either the permanent or temporary method of operating for colostomy, the lower segment of the bowel can be readily

irrigated whenever necessary, a very important procedure, in order to wash out any pus, fecal matter or débris likely to accumulate there.

If the disease for which colostomy is done is in the upper end of the sigmoid, open the bowel higher up in any part of the descending or transverse colon, but the previous injunction should always be borne in mind, never to make the opening higher than is absolutely necessary.

In cases of disease involving the transverse or upper portion of the ascending colon, where it becomes necessary to open the cæcum in order to give relief, it is better, if the case is malignant and operable, to resect the diseased portion of the bowel, or in inoperable cases to do an anastomosis between the healthy bowel above the growth, and a similar portion below it. In cases of ulceration or intractable inflammation of the colon, it is better to do an appendicostomy or a cæcostomy, as described in the chapter on ulceration. These recommendations are made in preference to right inguinal colostomy, on account of the fluid condition of the fæces in this locality.

CLOSURE OF A TEMPORARY ARTIFICIAL ANUS.—The method of closing an artificial anus will depend upon the manner in which it has been made. If the spur made is very acute, as shown by the fact that no fecal matter has ever passed over it into the lower segment of the bowel, the spur must first be cut through by clamping it with straight hysterectomy or long-clamp forceps, one blade of which is introduced into the upper and the other into the lower segment of the bowel. They are gradually tightened each day, until they cut their way through by pressure necrosis of the tissues. It requires from five to six days to do it, and it is very painful. After this, the fecal matter will readily pass down the lower segment of the bowel, and the artificial anus may close spontaneously. Should this not occur, the flaps of the bowel which were rolled back when the bowel was opened must be dissected loose, unrolled, put back in place, and stitched together with a double row of sutures, one through the mucous mem-

brane and the other through the serous layer, or as much of it together with the muscular layer as can be got, and the ends of the flaps stitched to the lower segment of the bowel, from which they were severed when the transverse incision was made, the edges of the flaps and the lower segment having first been freshened. The skin around the abdominal wound is to be freshened, and the abdominal wall dissected loose from the intestine for about one inch beneath the wall all around the wound, then the edges are brought together with silkworm-gut sutures. This method may give very satisfactory and successful results.

A second one consists in dissecting the bowel loose from its attachment to the abdominal walls, resecting both ends of the bowel that have protruded beyond the abdominal opening, and doing an end-to-end anastomosis, either by the aid of a Murphy button or by the Halstead method. I did this operation successfully some years ago, but found the walls of the bowel very much thickened and extensive adhesions which made the operation very difficult. I therefore advise the use of the first method if it can be done successfully.

PATHOLOGICAL GROWTHS, OR TUMORS OF THE ANUS, RECTUM, AND SIGMOID

" FOR practical purposes, a tumor may be defined as a persistent mass of redundant new formation, not obviously due to any extrinsic cause, which grows independently of the body, with which it is structurally and functionally uncombined; so that, although it generally assumes a more or less circumscribed form, it is nevertheless distinct from any known anomaly.

" Tumors grow and are nourished like normal parts of the body, yet in return for the nutriment thus supplied they contribute to it nothing useful; indeed, their relation to the rest of the organism differs but little from that of parasitism.

" Tumors may be classified on many bases—physiological, morphological, chemical, genetical, etiological, etc.; but by far the oldest and most generally useful classification is that which divides them, according to their physiological properties, into the *malignant* and *non-malignant* or benign, and for our immediate purpose this will suffice. Here, however, it must be noted that tumors exhibit many degrees of malignancy, both in the plus and minus directions." (W. Roger Williams, " Natural History of Cancer," page 3.)

Malignant Tumors.—These exhibit the following characteristics: (1) They infiltrate the surrounding tissues; (2) infect adjacent lymph glands; (3) tend to recur after removal; (4) become disseminated in distant organs; and (5) inevitably destroy life.

Innocent Tumors.—These are, as a rule: (1) encapsulated and, when diffuse, do not infiltrate; (2) do not infect the lymph glands; (3) nor recur after complete removal; (4) do not disseminate; and (5) only imperil life when they grow in the vicinity of vital organs.

There are two genera of tumors to which the adjective malignant is especially applicable—sarcomata and carcinomata.

It is important to bear in mind that innocent tumors may, and often do, destroy life. The essential difference between an innocent and a malignant tumor may be expressed thus: *The baneful effects of innocent tumors depend entirely on their environment, but malignant tumors destroy life whatever their situation.* (J. Bland-Sutton, " Tumors, Innocent and Malignant," page 2.)

The question of the origin of malignant from non-malignant tumors involves important practical issues, especially the proclivity of non-malignant tumors to become malignant. If any such tendency really exists, then non-malignant tumors ought to be promptly extirpated.

Prior to the application of the microscope to new growths, it was generally believed that every chronic tumor (" scirrhous ") either was malignant or tended to become so.

The difficulty then of discriminating between malignant and non-malignant tumor-like swellings rendered some such belief inevitable; but since the utilization of the microscope it is surprising to find the old creed still so influential.

Now, in the light of modern research is this belief justifiable?

Since innocent tumors may inflame, suppurate, ulcerate, necrose, and degenerate, just like physiological parts of the body, it seems not unreasonable to suppose on *a priori* grounds that they may also become the seat of malignant disease. The occasional coexistence in the same organ of benign and malignant tumors favors this view. Such are the chief considerations which have given rise to the common belief that innocent tumors are peculiarly apt to become malignant.

On critical examination of the subject, two considerations have much impressed me.

First, the rarity with which these two kinds of neoplasms coexist in the same organ; so that, even admitting that malig-

nant transformation to take place in all such associated neoplasms, the event must be one of great rarity—very much rarer than it would be if non-malignant tumors were especially prone to become malignant.

Secondly, the inconclusiveness of the evidence as to malignant growths in most of these cases having sprung from their non-malignant associates. In many instances, it is perfectly evident that the association is a mere coincidence, each neoplasm having originated independently. In others the coexisting neoplasms are more closely associated; but, even in these, the appearance of the non-malignant tumors is often such as hardly to countenance a belief that the malignant disease had sprung from them.

In short, thorough examination of the subject in all its bearings has convinced me that non-malignant tumors have no special proclivity to malignancy.

The possibility of benign tumors subsequently developing malignant characters has been thoroughly proved; but this is a very different thing from admitting that such tumors are specially prone to malignancy. This is disproved by the extreme rarity of the coincidence. Non-malignant tumors are, in fact, less liable to originate malignant disease than are the normal morphological elements of the body itself. (W. Roger Williams, " Natural History of Cancer," page 288.)

Adami, " Principles of Pathology," Vol. I, page 619: " It is the grade of vegetative power of the cells which determines their malignancy, though, as we shall point out (pages 628, 632), the malignancy of a given tumor in a given tissue of a given animal is the expression of the interaction between the cell malignancy and the resisting powers of that tissue toward the growth of that particular type of cell."

On what peculiar characteristic the malignancy of tumors depends is not definitely known. The chief histological difference between malignant and non-malignant is the atypical arrangement of their histological elements.

" In normal growth no tissue, no matter how vigorous its growth, can overcome the resistance to its growth that a neighboring tissue offers. Epidermis, when implanted in the subcutaneous tissues under the most favorable conditions, will for a time have a limited growth, but soon atrophies and disappears. The same thing happens when pieces of periosteum are implanted in places where periosteum does not normally exist. Experiments made with the inoculation of tumors show the same thing. Such inoculations have not only been made from man on the lower animals, but from animal to animal. In the most malignant tumors, where we know the effects produced on the *bearer* when particles of the tumor enter into the circulation, cells and juices from such tumors have with every precaution been injected into the circulation with negative results. A few positive results have indeed been claimed but their number is too few in view of the frequency with which such experiments have been made to lead us to have much confidence in them. Cohnheim assumes that the malignity of a tumor depends more upon the nature of the tissues of the bearer than upon any other moment. There must be a weakness, a want of resistance to the growth in the other tissues, to constitute malignity. This condition may be inherited or acquired. Age seems to be a predisposing moment, and Thiersch seeks in this want of resistance in the connective tissue, brought about by age, the cause of carcinomas in the connective tissue not resisting the growth of the epidermis. According to Cohnheim the germ of a tumor may remain quiescent for years, nay, it may never come to development, because it cannot overcome the physiological resistance of the tissues; but when from any cause this resistance is lowered or taken away, then we have the tumor; and a tumor is malignant just in the degree that this resistance is wanting. Inflammation may act in the same way by lowering the resistance, and if inflammation and traumas have any action in causing tumors it is most probably in this way." (W. T.

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Councilman, M.D., " Reference Handbook of the Medical Sciences," Vol. III, page 407.)

The classification of tumors of the rectum here used is from an histological basis, and the one in general use:

I.—Tumors derived from the connective-tissue group:

FIBROMA.—Composed of fibrous tissue.

MYXOMA.—Composed of well-formed isolated cells, of a somewhat stellate appearance, with a matrix containing a varying amount of mucin.

LIPOMA.—Composed of fatty tissue.

ENCHONDROMA.—Composed of cartilage.

LYMPHOMA.—Composed of cytogenic tissue, the type of which is found in the lymph glands or in the bone marrow.

ANGIOMA.—A tumor made up of blood-vessels.

These tumors all conform strictly in their structure to their physiological types.

II.—Now the group of sarcomas, which also come from the connective tissue but which are distinguished by the excess of cells over the formed material, thus conforming to the type of embryonic tissue:

SARCOMAS.—Spindle-cell Sarcoma, Round-cell Sarcoma, Alveolar Sarcoma, Melano-sarcoma, Chloroma.

PAPILLOMA.—A tumor whose chief constituents are epithelial cells, but which also contains vascular connective tissue, the whole being formed in accordance with physiological types. These types are the papilla of the skin and the villi of the intestine. According to their seat they are divided into the hard and soft papilloma.

ADENOMA.—One composed of glandular epithelium and vascular connective tissue, generally agreeing in the arrangement of its elements with some of the glandular structures of the body.

EPITHELIAL CARCINOMA (EPITHELIOMA).—A tumor composed of epithelium similar in character to the covering epithelium, but in the arrangement of its elements agreeing with no typical structure in the body. The cells are arranged

in masses, which are separated from each other by vascular connective tissue. Neither the fibres of the connective tissue nor the blood-vessels penetrate the masses of cells.

GLANDULAR CARCINOMA.—One having its origin in and principally composed of glandular epithelium, agreeing in its general structure with the epithelial carcinoma.

TERATOMA.—A tumor into whose structure a whole system of the body may enter, and which arises from parts where the tissues found in the tumor do not normally exist. The epidermic structures of the body are most often represented in these tumors (as in dermoid cysts).

Of this classification the sarcomas of the connective-tissue type and the carcinomas of the epithelial type are regarded as malignant.

Benign Tumors of the Rectum.—Under this heading I include all varieties of tumors before mentioned, except those described as malignant, viz., sarcomas and carcinomas.

In inflammatory affections of the intestine, the mucosa and submucosa are not infrequently the seat of inflammatory and hyperplastic growths involving both the connective tissue and the epithelium. These are usually secondary to necrotic and inflammatory processes, some of them of an infective nature, though sometimes arising without any demonstrable cause. (Ziegler, page 676.)

Most benign tumors found in the rectum are polypi and are found on mucous membrane.

The term polypus is used very indiscriminately, being frequently applied to any pedunculated growth on the mucous membrane, of whatever histological character, and also to many that are sessile, pyriform, and pendulous neoplasms. Let this term be confined to pedunculated tumors from the mucous membrane of the bowel; it does not imply the character of its histological elements.

While polypi may be found in any part of the intestinal canal, they are far more often found in the rectum. In children, they generally exist singly; in adults, they are more

often multiple, and generally found just within the upper margin of the anus, or lower portion of the rectum (Fig. 121). Varying in size from that of a pea to a large walnut, or even to that of a small lemon in rare cases, they are of various histological types, as fibroma, adenoma, cystoma, and lipoma, the most common being the soft, mucoid variety, which probably originates in an inflamed solitary follicle, the meshes of which are filled with a thick, viscid fluid, sometimes containing true Lieberkühn tubules. This variety is generally found in children.

FIG. 121.—A polypus taken from a large hemorrhoid.

The longer a polyp remains in the rectum (and as a rule the nearer it is situated to the grasp of the sphincter) the more elongated will be its pedicle. The pedicle is due to the elasticity and mobility of the tissues in which they develop, and to the peristaltic effort of the bowel to rid itself of the abnormal object. The pedicle is generally very narrow, but occasionally the tumor is attached by a broad band of mucous membrane. They are frequently passed outside of the anus

during defecation, and are grasped by the sphincter. So long as they remain well up in the rectum, they do not produce any marked symptoms, but when they are located near the sensitive margin of the anal canal they produce a frequent desire to defecate, or a feeling of fulness.

Polypi present different appearances according to their histological structures; sometimes a raspberry-like growth with soft, velvety surface. The lipomatous polypus appears smooth, shiny, and lobulated; sometimes it may be ulcerated on the surface. The fibroid polypus is spherical or ovoid in shape, covered with normal or bright red mucous membrane.

Diagnosis.—The diagnosis of a polypus is very simple. They are either seen protruding at the anal margin, can be felt by the finger, or can be seen through the proctoscope. When grasped between the fingers they may be soft and pliable, or firm and fibrous.

Treatment.—This consists either in twisting them off, or ligating the pedicle and snipping off the tumor beyond the ligature, or clamping the pedicle with an angiotribe, cauterizing it, and snipping off the tumor beyond the angiotribe. This latter method is best adapted to those attached by a broad mucous band. If not removed by the angiotribe, it is better to suture the edges of the broad band of attachment after the tumor has been cut off. No subsequent dressing will be necessary, but the rectum may be irrigated daily for one week with an antiseptic solution, which will also keep it clear of fecal matter.

Fibroma.—True fibroma of the anus and rectum are very rare. They are composed of fibrous connective tissue of the submucosa, and sometimes grow to a considerable size. Solid or cavernous, mural or pedunculated, they are yet different from a fibrous polypus, for while in the latter there may be a considerable amount of fibrous tissue, it is mixed with glandular and other elements. In a pure fibroma, the fibrous tissue is arranged in wavy bundles, and ordinarily contains very few blood-vessels. Sometimes the tumor contains more or less

jelly-like mucus. When the fibroma remains in the intestinal wall, it is spherical or ovoid in shape; is closely attached to the muscular coat, and the mucous membrane is movable over it. The symptoms are similar to those of mucous polypi.

Myxoma.—The myxomata are tumors composed, in the main, of well-formed isolated cells of a somewhat stellate appearance, which are separated from each other by a matrix containing varying amounts of mucin. In this matrix there are large but thin-walled vessels. While this is their structure in the main, it is rare that we come across what may be termed a pure myxoma. In general, areas of the tumor show more condensed fibrous tissue, or cartilaginous masses, or frequently lobules or collections of fat cells, while in other cases portions are of a sarcomatous type, and show close collections of spindle cells. Thus it is doubtful whether it should be regarded as a separate form of tumor, or rather a myxomatous modification or a degeneration of some one of the other forms.

These tumors, slow in growth, are soft and fluctuating, so as to give the impression, at times, of being cystic or fluid masses. They never form metastases, but, imperfectly removed, are liable to recur, while, again, a certain number take on sarcomatous properties and so may become malignant. In such cases, the metastases are not myxomatous, but wholly sarcomatous.

The favorite seat of such tumors is the buttocks, between the glutæi muscles. They sometimes form multiple soft polypi.

Lipoma.—Tumors composed of adipose tissue are found in the rectum, and also high up in the intestinal canal. They ordinarily develop in the submucous layer of the intestinal wall and are either closely attached to the rectal wall, or assume a polypoid shape with a pedicle. They may grow to considerable size, sometimes so dragging upon the rectal wall as to produce a prolapse of this organ.

These tumors are essentially benign, of slow growth, and do not recur after complete extirpation. They vary in consistency, according to the amount of connective-tissue matrix,

but ordinarily a true lipoma is soft and fluctuating. Rarely, portions of the tumor take on a sarcomatous development. These fatty tumors occasionally occur outside of the rectum, and yet are attached to its walls, which may obstruct its lumen by pressure.

Treatment.—When pedunculated, the pedicle should always be ligated before the tumor is removed, owing to the possibility of peritoneal invagination into the pedicle. When situated in the rectal wall it should be removed by an incision of the mucous membrane, enucleated, and, if possible, the wound closed by sutures.

Enchondroma.—This, one of the rarest tumors of the connective-tissue variety that occurs in the rectum, is composed of one or the other variety of cartilage, hyaline, fibrous, or reticulated (hyalo-enchondroma, fibro-enchondroma, reticulated enchondroma). They may be single or multiple, possessing in general a well-marked fibrous capsule and are globular or lobulated.

Sometimes there may be glandular tissue combined with the cartilage, and these mixed tumors are liable to take on sarcomatous characters, and become malignant. They grow slowly, are firm in consistency, and generally benign in character.

Lymphoma.—This type is occasionally found to develop from the lymphoid tissue, or solitary nodes, which exist in the rectum and through the large intestine. It is soft to the touch, and attains considerable size. As its definition implies, it is due to a hyperplasia of the lymphoid tissue. The tumors are slightly lobulated, always single, of a bright red color, and of a soft consistency. The symptoms produced by the tumors resemble those produced by polypi, and their treatment is similar to that for lipoma.

Angioma.—" We cannot but conclude that the majority of so-called angiomas, or tumors having vessels as their main constituent, are spurious blastomas, whether formed of blood-vessels (' *hæmangciomas* ') or of lymph vessels (' *lymphan-*

giomas '); *they possess no power of independent growth.*
Mere dilatation and filling of vessel spaces with fluid is not
growth, even if preceded by aplasia and followed by atrophy of
the tissue proper to the part.   And in the majority of cases
the evident increase in length of the vessels (such as must
occur in *cirsoid aneurisms*) or thickening of the walls of the
individual dilated loops (*such as we see in cavernomas*) is
apparently not in excess of the physiological requirements.
We find, that is, no evidence of proliferative capacity, at most
a widening of pre-existing vessels, either of congenital origin
and ascribable to a primary want of co-ordination in the growth
of the vessels of a part and of the tissue or cells they should
nourish, or of postnatal origin, due to alteration in blood
pressure or the nature of local venous obstruction, as, for
instance, in the multiple capillary telangiectases, which can be
produced in the liver by partial obstruction and stenosis of
the hepatic veins (*hemorrhoids* are of this nature), or due to
local atrophy of the cells of a restricted area in an organ,
the capillaries undergoing what we may speak of as compen-
satory dilatation.

"Independent growth is the test of what constitutes a
tumor of this order.   With this construction of the term true
angiomas are very rare in the rectum."   (Adami, " Principles
of Pathology," Vol. I, page 748.)

Tuttle only collected the reports of two such cases.   Adler
reported one, at the meeting of the American Proctologic
Society, June, 1909, which report with the illustrations I give.

Angiomas are derived from the submucosa and are usually
congenital.   The diagnosis is readily made by the tortuous
blood-vessels of the parts affected, and the infiltration of the
affected tissues.

Report of a case of nevus simplex of the anus and lower
portion of the rectum by Lewis H. Adler, Jr., of Philadelphia,
(Transactions of the American Proctologic Society, Vol. II,
page 168) :

CASE.—Male, aged forty, was seen March 24, 1909; the condition congenital. Symptoms: an external fulness at the anal margin, which was increased in walking or at stool; there was a prolapse of several tumors, supposedly hemorrhoidal, while at stool; there was frequent bleeding when the bowels were evacuated, and there was difficulty in having a stool on account of the blocking of the canal, by the increased fulness of the parts, both internal and external.

FIG. 122.—Nevus simplex.

Twenty years previously the internal hemorrhoids had been removed under ether anæsthesia, which gave him considerable relief for several years. The examination just prior to the operation revealed a mass of thickened skin about two inches in width, of a dull purplish hue, surrounding the anus with an elevation of about one-sixteenth of an inch; there were numerous hairs scattered over this area. When made to bear down, the hemorrhoidal masses protrude and the external portion is visibly increased. (The accompanying photograph was taken before the operation. Fig. 122.)

The patient was operated on March 29, 1909. He died a few hours after operation, from symptoms indicating cardiac embolism.

In excuse for reporting this case under the head of angioma, the pathological findings showed a moderate hyperplasia of the walls of the blood-vessels, which were surrounded with dense fibrous tissue. The skin covering the nevus was also thickened.

The two groups—sarcomas and epithelial carcinomas—will be described under Malignant Tumors.

Papilloma.—A papilloma is any growth on the skin or mucous membrane based upon or resembling a normal papilla. These stand midway between true tumors and inflammatory growths and are divided into two general groups, hard and soft.

A hard papilloma, a form in which the connective-tissue framework is denser and the cells fewer than usual. It grows chiefly from the skin.

A soft papilloma, one growing from the mucous membrane, especially in the uterus, rectum, and bladder. (Gould.)

ETIOLOGY.—Papillomas are generally due to a special irritation of the skin or mucous surfaces.

Hard Papilloma.—Of these growths found in and around the anal margin, and on the neighboring parts, may be mentioned, *warts,* and *condyloma acuminatum.*

WARTS.—" In these we deal with overgrowth of a collection of papillæ of the corium, covered by a common, thickened, and somewhat hypertrophied epiderm. They would seem to arise from irritation, are commonest in childhood, and have a marked tendency to disappear eventually. Some ascribe to them a definite infective origin, and clear evidence has been brought forward of their transmissibility." (Adami.)

The author has seen several cases of warts appearing around the anus on the perineum, labia, and buttocks; from one of these cases he removed some thirty or forty. Most of these were pigmented, and many of these either returned or

others formed in their stead. The fact that they sometimes return need not deter the surgeon from removing them. Their return may be obviated, in a measure, by touching their bases with pure carbolic acid, after removal.

Condyloma Acuminatum. — Long-continued irritation affecting any portion of the skin sometimes induces local hypertrophy of the papillæ, which increase in length and often become subdivided or branched. The cutaneous growth thus produced might be an *inflammatory fibrous papilloma* (Fig. 124). It is usually described as a *venereal wart* or cauliflower excrescence (condyloma acuminatum), although it will be shown not to be due to a specific organism. The special chronic irritation which induces it is that due to discharges from gonorrhœal inflammation, chancrous pus, and decomposed preputial or vaginal secretions. The following case (Fig. 123) is a good illustration:

CASE.—W. B. presented himself at St. Joseph's Hospital, August 3, 1909, with hard papillomas around the anal margin, extending laterally from one to two inches on the skin surface and from two to three inches above the anterior commissure on the perineum. Under the influence of ether anæsthesia I removed these growths with scissors, subsequently finding a blind sinus at the posterior commissure in the upper part of the anal canal which was the source of the irritation that caused the papillomas. The patient made a good recovery.

The papillomas are found around the anal margin, on the perineum and genitals, especially where opposite surfaces of the skin are in constant contact. They are firm in texture, usually whitish in tint, and may grow as large as an apple. They resemble in appearance the head of a cauliflower. The papillæ as they grow tend more and more to subdivide; they are composed of vascular fibrous tissue, they enclose a number of leucocytes, and their base is always infiltrated.

The epidermis overlying the hyperplastic papillæ is thickened. This form of papilloma is transmissible even more so than are the warts. (Ziegler.)

The nature of the contagium in these cases is still a mooted question; but there are reasons for believing, whatever it is, that it centres in the epidermoidal cells. (W. Roger Williams.)

FIG. 123.—Condyloma acuminatum.

Soft Papilloma.—These, growing from mucous membranes, in general afford the most satisfactory examples of the form of tumor which develops in direct continuity with, and clearly from, a normal epithelial membrane.

The direct cause of the excessive growth of the cells in this particular locality is not easy to determine. Sometimes there is a history of a previous intestinal inflammation or ulceration, but that does not explain why it should result in

FIG. 124.—Inflammatory fibrous papilloma.
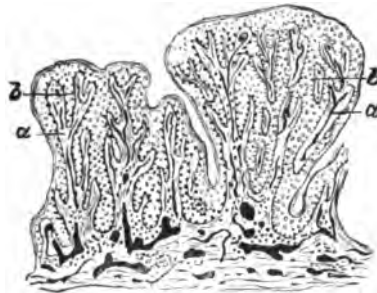
FIG. 125.—Finger-like papillomatous outgrowths. *a*, showing framework; *b*, showing the intervening cell.

these overgrowths in some individuals and not in others. They assume various forms, a simple nodular tumor, pedunculated and sessile, or masses of long fimbriated processes, resembling the fringe of an upholstered chair (Fig. 125, Adami), sometimes spoken of as villous tumors.

Such growths may show themselves on any part of the mucous membrane of the rectum or sigmoid. I have seen two cases of the fringe-like masses encircling the lower margin of the rectum, but was unable to get a photograph of them, and when the mass was extruded, as it always was, during the act of defecation, it hung as a fringe around the anal margin. They were satisfactorily removed by first passing a mattress suture through their base, and making it continuous around the entire anal margin. These tumors show a framework of connective tissue, which follows faithfully the branching of the growth, and is distinctly vascular. The outside of this is the epithelial layer. They may show abundant goblet-cells.

Adenoma.—As adenomas in general are composed of typical glandular epithelium, corresponding to the mother tissue in which they are found, those in the rectum and large intestine agree in character with its glandular elements. The most typical adenomas show a well-marked basement membrane, between the cell layer and the underlying stroma; where the growth is rapid and atypical this may be absent. While gland cells and stroma are essential to one another, the former are the dominant agents; the growth of the stroma follows that of the epithelium.

I only mention here adenomas proper and adenomatosis, the latter of which is generally multiple. The following statements are true for all: When completely removed there is no recurrence; they do not infect neighboring lymph glands, nor give rise to secondary deposits. When an adenoma causes death, it is in consequence of mechanical complications, depending on the situation and size of the tumor. (J. Bland-Sutton.)

Adenoma Proper.—An adenoma is a tumor constructed upon the type of and growing in connection with a secreting gland and must all be regarded as originating from cell nests. They are single or multiple, but much less numerous than where adenomatosis exists. In size varying from a small

cherry to that of a hen's egg, some cases have been reported weighing as much as four pounds. They are generally pedunculated and polypoid in shape (Fig. 126). A true adenoma of the rectum is very rare, as compared to adenocarcinoma of the same. The symptoms are identical with those of polypi, except that they bleed more freely. The treatment of simple adenoma is very simple. They may be twisted, tied, crushed, or destroyed by an angiotribe.

FIG. 126.—Rectal adenoma.

Adenomatosis.—In this condition portions of the glandular tissue or surface become the seat of exuberant irregular adenomatous overgrowth, with evident functional disturbance. No sharp line of demarcation can be drawn between this and the preceding class. Under this heading come the multiple adenomatous polyps of the alimentary canal. (Adami.)

The symptoms, course, and pathology of this condition differ in many respects from those of simple adenomas. " It is frequently supposed that multiple adenomata originate in the simple type; there is no case reported, however, in which a single or simple adenoma recognized in childhood has ever

developed into the multiple variety in after years." (Tuttle.)

In cases of multiple adenoma a number of neoplasms similar in size and stage of development are observed from the beginning of the symptoms, as though they had originated at the same time, from the same cause.

The exact cause of adenoma is not definitely known. Multiple adenomas vary in size, form, and appearance. They may

FIG. 127.—Multiple adenoma.

be smooth, round and shiny or rough and wart-like, resembling a raspberry (Fig. 127). Sometimes spherical or elongated, their size may vary from a small pea to that of a hazel-nut, or larger. The tumors may be either hard or soft, according to the amount of connective-tissue stroma they contain and the extent of degeneration which has taken place. They are pedunculated, although the very small tumors may be sessile.

Generally there exists a proctitis or colitis with multiple

adenoma, generally supposed to be due to trophic changes in the mucous membrane of the large intestine and to infiltration of the connective tissue; but is not caused by the irritation of the mucous membrane by the adenomas.

Sir Charles Ball in his work " The Rectum," page 216, says that Dr. Bellela of Alexandria (Progrés. Med., No. 30, 1885) noted the occurrence of adenomata of the rectum caused by the deposit of the ova of Bilharzia hæmatobia in the mucous membrane.

SYMPTOMS.—These are diarrhœa, discharges of mucus and blood, pain, exhaustion, anæmia, and general debility, and when the tumors are large in size the passage of fecal matter is obstructed.

DIAGNOSIS.—This is readily made by the subjective symptoms together with a digital and proctoscopic examination.

Here is a typical case of multiple adenomata reported by Dr. George B. Evans, of Dayton, Ohio: Mr. H., aged forty-four, plasterer, married, was admitted to St. Elizabeth's Hospital July 29, 1903. Proctoscopic examination revealed eight adenomatas, two inches above the internal sphincter. Two of these were much harder than the others and were evidently fibro-adenomatas. Upon introducing the protoscope farther up the rectum a large mass of small gelatinous polypi came into view. Two days later under a general anæsthetic Dr. Evans operated and removed the mass of polypi with a sharp curette, being unable to use the ligature or snare on account of excessive hemorrhage. The hemorrhage following curetting was controlled by packing with gauze wrung out of hot water. The patient made an uneventful recovery. A pathological examination of several of these polypi, especially the fibro-adenomatas, indicated them to be benign in character. Notwithstanding, by November of the same year, malignancy had developed at the seat of the fibro-adenomatas, and the patient refusing further surgical interference, died February 26, 1904.

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Malignant Transformation.—It seems to be generally recognized that there is a strong tendency for multiple adenoma to become malignant. This tendency often manifests itself by the simple and malignant type existing in the same patient side by side, and occasionally even in the same tumor. Wulff states that only the multiple variety of adenoma show this tendency to malignant transformation. Tuttle also states that this agrees entirely with his experience, and further says: " There are no authenticated cases on record where a single pedunculated adenoid polypus has recurred in the form of a carcinoma."

This predisposition to malignant transformation of multiple adenoids, together with the exhausting rectal symptoms before enumerated, makes this type of adenoma very dangerous. So frequently scattered throughout the course of the large bowel, their entire eradication or palliation of their concomitant symptoms becomes equally difficult and the prognosis in all such cases is very grave.

Treatment.—Medicinal treatment by mouth and by irrigation affords only very temporary relief, and should never be relied upon as a curative measure; it only entails loss of valuable time.

It is very important at the earliest opportunity to ascertain whether or not any of the adenoma have undergone malignant degeneration. This can be done by removing and examining several of them. If any indication of malignancy is shown, nothing short of an excision of the affected area should be undertaken. When not malignant, excise them through a proctoscope from the anal orifice, as high up the bowel as they can be reached. This can be done by twisting them off with long forceps, or by ligature, but far better by Lynch's Electric Angiotribe, worked through a large-size proctoscope. Thoroughly and completely to do this requires repeated sittings, and let treatment be continued as long as any adenoma show themselves.

Where they have undergone malignant degeneration, it seems to be the consensus of opinion that the only thing to give permanent relief is to excise the entire affected area of the bowel.

Colostomy and cæcostomy have been done for diverting the fecal current and for the purpose of more thorough irrigation, but have almost invariably failed in giving permanent relief. Cæcostomy and appendicostomy combined with anastomosis between the ileum and the lower portion of the sigmoid colon, as done by Lilienthal, Rotter and Holtman, has given better results, but in Lilienthal's case it was found necessary to excise the entire large bowel between the points of anastomosis of the ileum with the lower portion of the sigmoid, as the tumor showed no decrease in size, nor was there any permanent improvement in the symptoms.

TERATOMA.—I will only speak of such of these tumors as represent the epidermic structures of the body, and of these only those known as postrectal and rectal dermoids, including under this list (although not properly belonging to it) simple cysts.

Dermoids of the Rectum.—To appreciate the nature of dermoids arising in the immediate neighborhood of the rectum, it will be necessary to consider a few points connected with the embryology of this portion of the alimentary canal. In the early embryo, the central canal of the spinal cord and the alimentary canal are continuous around the caudal extremity of the notochord. This passage, which brings the developing cord and gut into such intimate union, is known as the neurenteric canal. When the proctodæum invaginates to form part of the cloacal chamber it meets the gut at a point some distance anterior to the spot where the neurenteric canal opens into it; hence there is for a time a segment of intestine extending behind the anus, and termed in consequence the "postanal gut." Afterward this postanal section of the embryonic intestine disappears, leaving merely a trace of its existence in the small structure at the tip of the coccyx, known as the coccygeal

body. There is a good reason to regard the postanal gut as the source of that variety of congenital sacrococcygeal tumor which was named by Braune (*Die Doppelbildungen,* 1862) and by several writers who followed him " congenital cystic sarcoma." These will be referred to as tumors of the postanal gut. In addition, it will be necessary to consider dermoids situated between the rectum and the hollow of the sacrum, *postrectal dermoids,* and certain pedunculated tumors situated within the rectum, *rectal dermoids.*

Tumors arising in the postanal gut exhibit a definite structure, being composed of closed vesicles lined with glandular epithelium, and containing glue-like fluid. Many of these tumors are composed of cysts and duct-like passages lined with cubical epithelium, held together by richly cellular connective tissue. In many situations the epithelium is columnar, set upon flatter cubical cells. The cysts are filled with ropy mucus, and vary in size from a nutshell to the smallest space visible to the naked eye; many contain intracystic processes. These tumors present such very definite characters that they are sure to attract attention, and their large size makes them very conspicuous.

Middeldorpf was the first to associate clearly a congenital sacrococcygeal tumor with the postanal gut. His specimen was removed from the neighborhood of the anus of a girl one year old and contained connective tissue, mucous membrane with characteristic follicles, submucous tissue, longitudinal and circular layers of muscle fibres. His case is the most conclusive on record.

Postrectal Dermoids.—These, very rare, do not form such large projecting masses as the preceding species. In many instances not noticed until after infant life, their clinical tendencies are moreover of a different character. It is also somewhat remarkable that dermoids, although met with in many parts of the body, contain teeth only in certain situations; the postrectal region comes into this category.

Such dermoids also occur as surgical surprises, especially when they attain very large dimensions and extend upward behind the pelvic peritoneum of men and women. Ord recorded a remarkable case which occurred in a man of twenty-eight; the dermoid weighed fourteen pounds. Page successfully removed a dermoid weighing three pounds, which occupied the hollow of the sacrum in a woman of forty-seven. It lay behind the rectum.

Skutsch, again, records two examples of postrectal dermoids, and collected the chief German cases. One interesting from the fact that the patient was pregnant, and he was able to empty and partially enucleate the dermoid through an incision in the perineum without disturbing the pregnancy.

Postrectal dermoids sometimes open spontaneously in the perineum; the fistula is usually situated in the middle line of the perineum near the tip of the coccyx. The student should compare pharyngeal and postrectal dermoids; they are probably teratomata.

Rectal Dermoids.—Several examples of dermoid tumors have been described growing from the mucous membrane of the rectum; a curious feature in these cases is that the tumors are furnished with long locks of hair, which protrude from the anus and annoy the patient. Like postrectal dermoids, they sometimes contain teeth. Danzel observed such a tumor in a woman of twenty-five as large as an apple, and it was said to contain brain substance enclosed in a bony capsule; a tooth projected from it. This woman was troubled with long hairs which protruded at the anus, and she used to pull them out with her hands. (J. Bland-Sutton.)

Treatment.—Let them be removed by carefully dissecting them out, under rigid antiseptic technic, and closing the wound, or if pedunculated ligate the pedicle and remove the tumor.

Postanal Dimples.—These occur in the region of the sacrum, coccyx, and the posterior margin of the anus, and are supposed to be due to imperfect union between the two lateral halves of the fetal body. They consist generally of a

cylindrical depression, which looks upward and backward, and ends in a blind sinus, varying in depth from one to several inches, or there may be a simple depression without any sinus. They are lined with true epithelium and contain sebaceous glands and hair follicles. These should be distinguished from sinuses occurring in the sacrococcygeal region from obstructed sebaceous follicles.

The author has seen at least half a dozen postanal dimples, two of which occurred in twin brothers, who in all respects, so far as could be seen, were the exact counterpart of each other.

Treatment.—If the case only consists of a dimple without a sinus it may be left alone, but should there be one, especially one discharging pus, frequently the case, open it up to the bottom, dissect off the surface of the entire channel, and close the wound by silk or silkworm-gut sutures, passed beneath and outside of the sinus, and draw the edges together.

Hypertrophied Anal Papillæ.—These normal protuberances at the upper margin of the anorectal line are subject to hypertrophy and under such conditions become very sensitive, adding very much to the discomfort of the patient. They could in no sense be considered a tumor, but should be removed with scissors whenever enlarged and sensitive.

MALIGNANT TUMORS OF THE RECTUM : CARCINOMAS AND SARCOMAS

Carcinomas.—" Every variety of carcinoma to which mucous membranes are subject appears in the rectum and sigmoid."

There are four elementary types of cancer found in the anus, rectum, and sigmoid, viz., epitheliomatous, adenoid, medullary, and scirrhous carcinomas, malignant adenocarcinomas being the commonest.

" The rectum, sigmoid, splenic, and hepatic flexures of the colon, together with the cæcum, are the commonest seats.

Rectal cancer sometimes extends only to parts about the anus, but in other cases it infiltrates the intestines for a considerable distance.

"Intestinal cancer takes the form of soft fungous tumors, generally solitary and sharply circumscribed (Fig. 128), or spreading over a considerable area (Fig. 129). Infiltration of the intestinal wall with cancer-cells usually takes place at
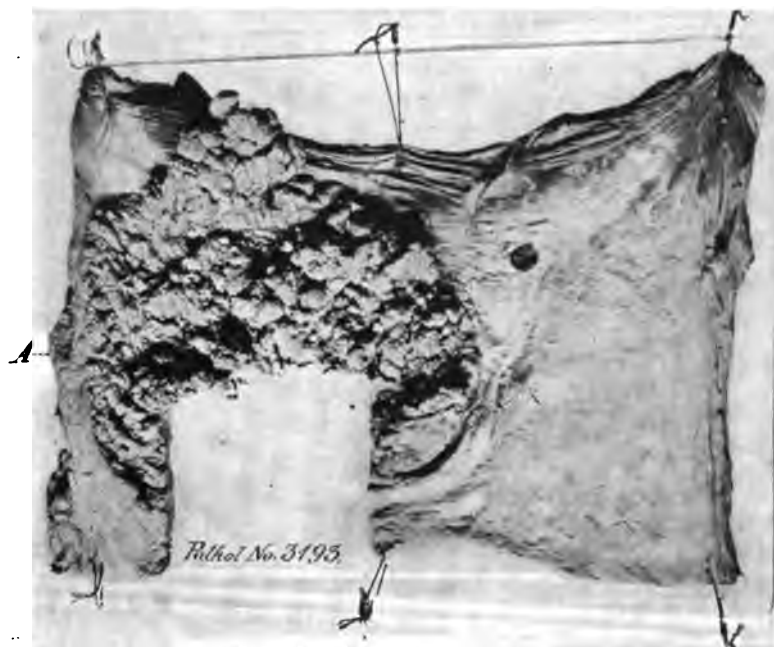
FIG. 128.—Photograph of an alcohol specimen showing an adenocarcinoma in the form of a superficial papillomatous ulcer beginning just above the anus (A). The ulcer is not quite annular. This tumor was removed by Bloodgood in July, 1900. The patient is still free from recurrence December, 1909. There was no metastasis to glands.

an early stage and leads to thickening and induration. If this extends round the whole circumference of the bowel, it is transformed into a thick-walled rigid tube; the rectum is the commonest seat of this indurated change, and, less frequently, the colon.

"On post-mortem examination of most cases we find the surface of the neoplasm already broken down, leaving a can-

cerous ulcer with characteristically infiltrated borders. But sometimes the borders likewise are disintegrated and eroded, and then the ulcer has quite the appearance of an ordinary non-malignant inflammatory ulcer. In other cases the borders and floor of the ulcer become seared over and shrunken, lead-

FIG. 130.—Photograph of fresh specimen (by Schapiro). Colloid adenocarcinoma of the rectum. *Mm*, mucous membrane edge of ulcer (*Ul*); *T*, the tumor proper has been divided; it is about 2 cm. in thickness. It represents a much larger tumor mass than the ordinary adenocarcinoma of the rectum. This tumor was removed by Bloodgood in August, 1907, by the combined abdominal and sacral route. No recurrence two years and six months since the operation. Age thirty-seven, symptoms 21 months. At first bloody diarrhœa, then constipation with ribbon stools.

ing sometimes to extreme constriction of the bowel; particularly apt to occur when the ulceration extends in an annular form around the intestine (Figs. 130, 131).

"When a cancer of the intestine breaks down and ulcerates, at the same time invading the deeper layers of the wall, it
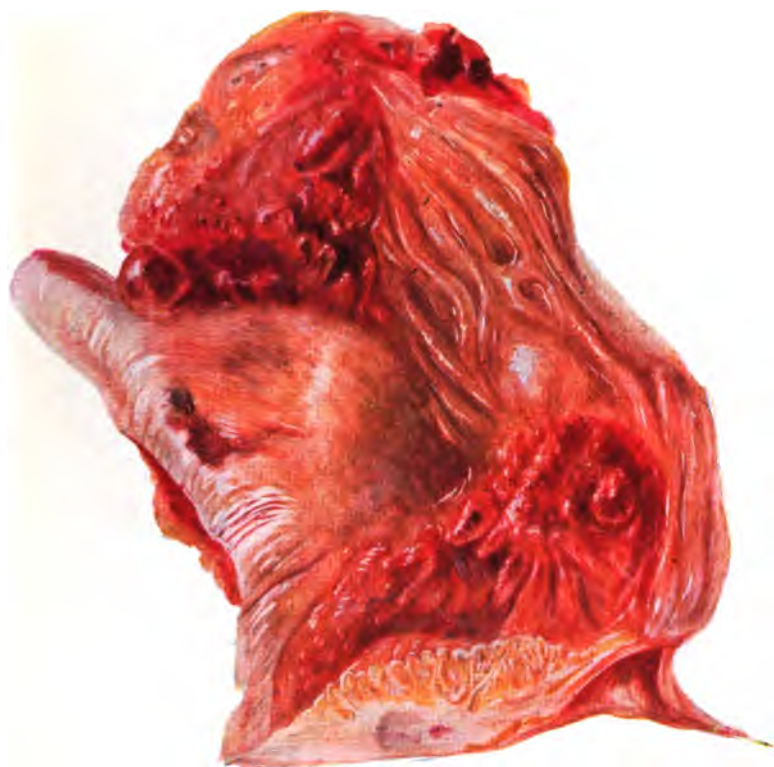
Fig. 129.—Painting from fresh specimen of an adenocarcinomatous ulcer just above the anus similar in pathology to the one illustrated in Fig. 128. The surface and section of the ulcer are shown. White female, aged thirty-nine, symptoms 14 months. Operation by Finney, February, 1906.

generally induces inflammatory changes in the serous coat. These lead to the formation of new vascular fibrous tissue, by which the affected part of the bowel is bound down to the surrounding structures. Perforation of the intestine occurs

FIG. 131.—Photomicrograph (by Schapiro) of the colloid adenocarcinoma shown in Fig. 130. *A*, the dilated and hypertrophied mucous gland; *B*, colloid areas losing their epithelial lining; *C*, a colloid cyst without epithelial lining; *D*, an epithelial nest with little colloid material. The prognosis for tumors of this character is relatively good. The tumor was situated 7 cm. above the anus; it had infiltrated into the perirectal fat.

in some cases as a result of cancerous ulceration. Metastatic growths are met with chiefly in the lymph-glands, peritoneum, and liver." (Ziegler.)

Seat of the Disease.—According to statistics compiled by Tuttle, 4.8 per cent. of all cancers occurred in the rectum.

Adding to these cases occurring in the sigmoid flexure, the percentage is raised to 6.2 per cent. The relative frequency with which the different portions of the rectum are affected is shown by the same author in the following manner: He divides the rectum into four portions: the anal, all that part of the rectum below the internal sphincter; the infraperitoneal, from the internal sphincter to the tip of the coccyx, about two inches in extent; the supraperitoneal, from the tip of the coccyx to the rectosigmoidal juncture opposite the third sacral vertebra; and the sigmoidal extends from this point to the lower end of the descending colon. Of these respective portions he gives the following results from a collection of 1029 cases of cancer. In the anus and rectum it occurred in 901 cases, and in the sigmoid flexure 128 were reported. Of those in the anus and rectum the seat of the disease has been quite definitely stated in 602 cases. The anus was chiefly involved in 6.7 per cent., the infraperitoneal portion in 26.3 per cent., and the supraperitoneal portion in 67 per cent. The fact that such a high percentage occurred in the supraperitoneal portion demonstrates the fact that a very large proportion of cancers of the rectum cannot be extirpated without opening the peritoneal cavity. According to J. Bland-Sutton, of every one hundred cases of carcinoma of the intestine, from the beginning of the duodenum to the anus, seventy-five occur in the rectum; of the remainder, twenty-three would be localized in the large bowel, and two in the small intestine, including the ileocæcal valve.

" The types of neoplasms found at these various sites in a general way were as follows: The squamous or pavement epithelioma was found in the anal portion; the adenocarcinoma and medullary cancer in the infraperitoneal and lower portion of the supraperitoneal areas; medullary and scirrhous carcinomas chiefly in the supraperitoneal portion and in the sigmoid flexure." (Tuttle.)

These findings, as might be expected, are subject to numerous variations.

I now take up in detail the four elementary types of car-- cinoma of the anus, rectum, and sigmoid, as previously given.

Epithelioma.—I confine myself here to the squamous variety, occurring chiefly at the mucocutaneous border of the anus. I note Ziegler says of this variety: " The flat-celled epithelial cancer is characterized by the formation of relatively large strings of cells of irregular shape; but besides these there are often small strings of cells, especially in those cases in which the cancerous growth has begun to involve the larger areas of the mucous membrane. The epithelial cells which are massed together in separate collections still show plainly the character of the laminated epithelium; but in consequence of their growth and multiplication within the interstices of the tissues, they generally assume a variety of shapes and no longer manifest their typical characteristics. Very often the formation of keratohyalin and the change into a horny con- dition takes place deep down in the centre of the large epithe- lial plugs; and along with the process of hornification the cells arrange themselves in laminæ like those of an onion. Those rounded masses of laminated, horny epithelium are called *epithelial pearls* or *horny bodies;* and hence the name *horny cancer* has been applied to such a tumor " (Fig. 132).

They begin as slight nodular elevations in the skin or in the mucocutaneous surface at the margin of the anus, the covering surface of which is not movable over these elevations; their bases are always indurated. After awhile these nodules break down and discharge a watery ichorous fluid; they have a distinct tendency to form scabs, and when a scab falls off the ulcer increases in circumference and soon other distinct nodules form around the edges of the ulceration. This con- tinues until the anus is surrounded by these nodular growths, or they extend to the perineum or surrounding buttocks, but there is little tendency to extend far up into the rectum. As a rule, the growth of epitheliomas is very slow, but I have observed that, recurring after extirpation, their growth is much more rapid. There may or may not be much pain.

Adenocarcinoma (Malignant Adenoma).—The growth in these is made up of glandular recesses lined with tall columnar cells; similar to those lining Lieberkühn follicles, imbedded in a stroma of dense connective tissue. In order to make out the nature of the growth, let sections be taken from the margins of the tumor, because the deeper points are much altered by ulcerative and necrotic changes.

FIG. 132.—Epithelioma of the anal margin.

Judging merely from the appearances under the microscope it would be difficult to determine whether the section was prepared from an adenoma or from an adenocarcinoma, but it must be borne in mind that the adenoma remains restricted to the mucous membrane, whereas in adenocarcinoma we find the glands with their characteristic columnar cells interspersed among the muscular fasciculi of the bowel wall. The proportion of connective tissue varies greatly. In some adenocarcinomas the glands are closely set; in others ill-

formed, arranged irregularly, and imbedded in an abundance
of connective tissue. Occasionally collections of lymphoid
tissue are observed.

With an invasion of adenocarcinoma of the rectum into
the anus, the part of the tumor which involves the anus loses
its glandular character and assumes the squamous-celled form
(Harrison Cripps). When it invades the peritoneum, this
serous membrane will sometimes become dotted over with
minute elevations, like sago grains. " Adenocarcinoma is very
rare before the age of twenty; it is commonly met with between
the thirtieth and fifty-fifth years." (Bland-Sutton.)

Clinically these growths appear as soft elevated lobular
masses projecting into the lumen of the bowel. They exude
the so-called cancer juice, which becomes milky white when
dropped into water, and may grow very rapidly, attended with
an abundant discharge of mucus, and often bleed freely (Fig.
133).

Metastasis as a rule takes place early, the liver being the
seat of secondary deposits in a large proportion of cases. Occa-
sionally, wide-spread dissemination occurs, and nodules are
formed also in the lungs, kidneys, and bones. All these sec-
ondary deposits possess the characteristics of the primary
growth, namely, the glandular epithelial cells, similar to those
found in Lieberkühn follicles.

Medullary Carcinoma (Soft Cancer).—" In this form the
cell growth is abundant and predominant, while the stroma is
inconsiderable." The majority of carcinomas of the rectum
and sigmoid assume this soft medullary character.

Clinically it takes the form of soft fungous excrescences,
or low rounded swellings. As the central parts break down,
these growths give place to ulcers with raised borders that
are white and pulpy in appearance. " After the destruction of
the new growth, fibrous induration of the mucous wall very
frequently takes place. This form produces many metastases."
(Ziegler.)

"This is the most malignant of all types of carcinoma. It bleeds easily, discharges abundant pus, grows rapidly, and soon involves the neighboring organs. It ordinarily occurs earlier in life than scirrhous. Glandular involvement is earlier than in any other form of cancer." (Tuttle.)

Scirrhous Cancer (Hard Cancer).—This type, the least frequent and the slowest of growth of all cancers of the
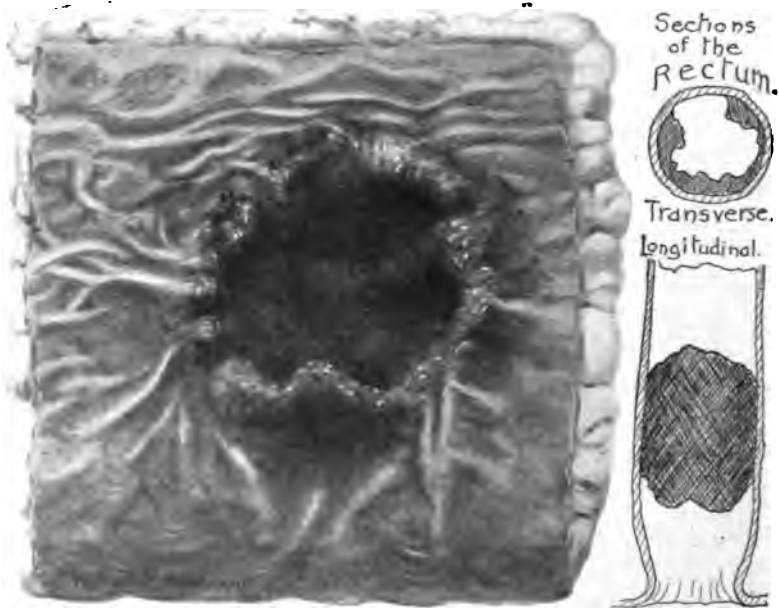
Fig. 133.—Adenocarcinoma (which was removed by the author) possessing these characteristics.

rectum, has for its most marked feature the overgrowth of its stroma, the cancer cells in such cases being small and compressed. It is composed of dense fibrous stroma and epithelial cells. The stroma is so arranged as to form a series of alveoli, which contain the epithelial cells.

Clinically these tumors present the condition of a gradually contracting stricture of the rectum or sigmoid. They are attended with little or no pain, very little discharge, and no

hemorrhage. Cachexia and sepsis are practically absent, and it generally produces death through complete intestinal obstruction or rupture of the bowel above the growth. Subject to hyaline, mucoid, colloid, and fatty degeneration, melanosis has also been observed and calcareous infiltration of the tumor is not infrequently seen. It infiltrates the deeper tissues and is less likely to recur after complete removal than any form of carcinoma.

Colloid degeneration may develop in any of the four types just mentioned. These degenerative changes affect both epithelial cells and stroma. When the substance that distends the alveoli is more viscid than gelatinous, it is called mucoid degeneration. When either of these degenerative changes have taken place it is best to consider them under the head of gelatinous types of cancer.

SYMPTOMS.—The symptoms of cancer in the rectum vary with the stage of the disease, type of growth, and its location in the canal. As a rule, it may be said, the farther they are removed above the anal orifice, the longer they are likely to remain unobserved. It is astonishing what headway the majority have made when first seen by the rectal surgeon. While in part due to a want of appreciation of the symptoms which should lead to an examination of the rectum by the general practitioner, in many instances the symptoms have not been sufficiently annoying to cause the patient to even seek advice from his family physician. I take this opportunity, however, to impress upon the general practitioner the great importance of promptly examining the rectum as soon as the patient complains of any of the following symptoms. The importance of this injunction will be better appreciated when the advantages of early operation are shown. Among the earliest symptoms frequently recalled by patients are a feeling of discomfort in the region of the sacrum or around the pelvis; an increasing tendency to constipation, sometimes alternating with diarrhœa in a certain number, or to diarrhœa in others with slight digestive derangements. The pain, bearing

down, and a feeling of weight in the pelvis gradually increases, until they become so severe that medical advice is sought. Frequently by this time, however, the growth is well developed. The above symptoms are followed by discharges from the bowel of mucus, sometimes streaked with blood; the discharge is first mucus, followed later by a distinct discharge of blood; sometimes the first abnormal discharge is of blood. This is likely to contain small clots, and the fluid part is thin and watery on account of its admixture with fluid fecal matter. These discharges should always lead to an immediate and most careful examination of the bowel by the physician. Let the rectum be washed out, and make a thorough digital examination, assisted by compression of the abdominal walls with the left hand, after which the rectum and sigmoid are to be carefully examined with the pneumatic proctoscope and sigmoidoscope. Where there have been several recurrences of bleeding which cannot be accounted for in the lower rectum, a negative result following both a digital and a proctoscopic examination cannot be regarded as positive proof of the absence of a growth higher up the bowel. I recall two such cases which I have seen within the last year, where an examination with a ten-inch sigmoidoscope failed to discover the growth or any abnormal change in the wall of the sigmoid, yet, upon opening the abdomen, the upper part of the sigmoid was found to be almost obstructed by a carcinoma which encircled the bowel at this point. If the growth can be located and seen a small portion of it should be removed with specimen forceps, after which it can be examined under the microscope and the character of the growth determined. If the carcinoma is within reach of the finger, it may be appreciated at a very early stage, when it is only a small deposit beneath the mucous membrane, slightly movable upon the muscular wall, making the rectal wall less supple. If the growth is seen when only a papillary excrescence, protruding into the rectal lumen with an indurated base, it should be looked upon with suspicion, being probably an adenocarci-

noma. The thickened indurated rectal wall surrounding a growth is one of the most suggestive and earliest symptoms of malignancy to be appreciated by touch.

Dr. George Blumer, of New Haven, Conn., calls attention to a very important symptom of an early secondary growth to be found in the rectum, generally as a result of metastasis from gastric carcinoma to Douglas' pouch, which he designates as the rectal shelf.

" If one passes the finger into the rectum in these cases the lower portion of the bowel is usually normal, it is not until the prostate gland has been passed that an abnormality is detected. Just above the prostate in some cases, in others at the limit of palpability, two to four centimeters above, if the finger is passed along the anterior rectal wall, it impinges upon a shelf of almost cartilaginous feel, which projects into the rectal cavity. In some cases further palpation shows that the whole rectum is involved in an annular zone of infiltration more marked anteriorly and tapering off towards the posterior wall, a signet ring stricture, as Schnitzler calls it."

While a similar thickening of the tissues of this pouch may be found in cases of diffuse inflammation of the peritoneum, especially diffuse tuberculosis, in the former the infiltration is much more dense and cartilaginous to the feel, while in the latter there are accompanying symptoms of general tubercular peritonitis which will assist in differentiating the two conditions.

While this condition is a secondary growth an early metastasis, it is likely to be mistaken for a primary one, especially when the symptoms of the latter are very obscure as has been shown on several occasions when an operation on the secondary growth in the rectum was followed by an operation for carcinoma of the stomach in less than a year.

A scirrhous carcinoma of the rectum or sigmoid in its early stages, especially before it has undergone degeneration, resembles very closely a simple fibrous stricture. The history of such a case may materially help in making the diagnosis,

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as simple inflammatory strictures are nearly always preceded by traumatism, ulceration, or suppuration.

In the active or proliferative stage of these tumors, the symptoms are much more marked. In scirrhous or annular carcinoma, which is chiefly met with in the upper rectum and sigmoid, gradually increasing constipation is a typical symptom.

If within reach of the finger, and it can frequently be brought within reach by firm pressure on the lower part of the abdomen with the other hand, the sensation of a dense, inelastic, nodular mass is imparted to it, with the lumen of the bowel very much contracted.

An entirely different picture is presented in the second stage of adenocarcinoma. Here we have as a rule frequent calls to defecation, resulting in considerable straining, with the passage of gas, with small amounts of mucus, with or without blood. These frequent calls to the toilet may have to be repeated from ten to fifteen times during the day, with no satisfactory results. Usually this tendency to diarrhœa is quiescent during the night, but the patient is almost invariably called to evacuate immediately upon rising in the morning. The first two or three early morning stools consist almost entirely of mucus, pus, and blood; after which the patient may have a very satisfactory fecal movement, followed by a return of the teasing and unsatisfactory mucous discharges for the remainder of the day. Hemorrhages may be frequent and slight, or occasional and large; in the former case the blood is likely to be dark, very thin, grumous, resembling prune juice in color, with a distinctly characteristic odor often very offensive. When the hemorrhage is large, the blood will be dark if it has remained in the bowel for any length of time, and grumous, but if passed soon after its discharge into the bowel it will be bright red, and generally indicate that the growth is low down in the bowel.

Pain is likely to be very marked at this stage. It may be dull, vague, and shooting down the extremities, or sharp and

burning; frequently influenced by posture, but not following any definite rule. It is generally increased by the act of defecation, and is more constant and decided the nearer the growth approaches to the sphincters. When the sphincters are involved in the growth, there is likely to be incontinence of fæces.

A digital examination in these cases reveals a variety of conditions. Sometimes a hard lobulated mass protrudes into the rectum from almost its entire circumference; at others it may be attached only to a small portion of the same; the mass may be a proliferating cauliflower-like growth; or there may be a deep excavating ulcer with its base and the walls of the bowel indurated throughout its entire circumference to such an extent as to produce a narrowing of its calibre.

At this stage the constitutional symptoms are likely to be very marked, such as loss of flesh, anæmia, increasing sallowness of the skin, and loss of appetite.

In the medullary type the symptoms are even more marked, the pain greater, the discharge more profuse, and of a fetid gangrenous and disgusting odor, the constitutional symptoms much more pronounced and rapid in showing themselves. A digital examination reveals a dense ulcerated mass with sharply defined edges, surrounding a crater-like cavity. Sometimes it comes in contact with a soft brain-like mass, which may be isolated and easily broken down. The proctoscope may also help to show up these conditions when beyond the reach of the finger, but as a rule much more can be learned from a digital examination.

With the increase in the growth the adjoining organs become involved and their functions interfered with.

I had an inoperable case of carcinoma of the rectum, on which I did a left inguinal colostomy, and after several weeks of comfort both ureters became involved, and the patient did not pass any water into the bladder for four or five days prior to her death.

All of the above symptoms continue to increase until death closes the scene, either from a general septicæmia or complete obstruction of the bowel. The latter rarely occurs, either because it is anticipated by a colostomy, or because the types of cancer which occur most frequently in the rectum, viz., adenocarcinoma and medullary carcinoma, are soft, friable, and ulcerate chiefly upon the surface, thus keeping the calibre of the bowel opened. This accident, however, is always imminent in carcinoma of the sigmoid, where the type of the malignant growth is most frequently scirrhous. I recall one case of death in my own experience from complete obstruction by this type of carcinoma, which occurred in the lower portion of the sigmoid.

Another cause of death in many of these forms of carcinoma, but especially in the scirrhous, is rupture of the bowel just above the growth, which in turn is due to the obstruction offered by the malignant growth to the passage of fecal matter, the consequent distention of the bowel above this point, and its subsequent ulceration.

Perirectal abscesses are likely to develop in the later stages of carcinoma of the rectum, which may result in fistula, or open into adjoining organs. These collections of pus are likely to be accompanied by septic symptoms, such as high temperature and chills. They may result in extensive gangrene and sloughing.

From the extensive inflammatory conditions around the growth, the rectum is likely to become attached to the adjoining organs and pelvis without being involved in the malignant growth, at least in the early existence of such attachments.

MANNER OF EXTENSION.—" While sarcomas exhibit a predilection to extend by means of the circulatory system, carcinomas show a similar selection of the lymphatic system for extension. This does not mean that carcinomas cannot form metastases along the vascular channels. In general the cells infiltrating the lymph spaces of a tumor find their way thus into the lymph channels, and then either by continuous

growth along those channels or by becoming detached are found in the group of lymph glands draining the region affected." (Adami.)

In epitheliomas involving the anal canal the disease extends by continuity to the surrounding perineum, scrotum, vulva, and ischiorectal fossa. The lymphatic involvement in these cases travels in the line of the inguinal vessels and glands, where the enlarged glands can always be found. "When the disease involves the ischiorectal fossa, the lymphatic extension is along the line of the middle hemorrhoidal lymphatics, and from the latter the hypogastric chain of glands become involved." (Quenu and Hartmann.)

When the carcinoma appears in the subperitoneal portion of the rectum, the extension involves the prostate, the seminal vesicles, bladder, urethra, or the vagina and uterus. In this case the retrorectal and hypogastric chain of glands also become involved.

If the supraperitoneal portion of the rectum and lower sigmoid are the seat of disease, the peritoneum, uterus, and bladder are in the line of extension. Sometimes it may involve the pelvic bones. The line of lymphatic extension in this case is sometimes the hypogastric, but generally the anterovertebral chain.

The liver is the most frequent seat of secondary deposits.

DIAGNOSIS.—I spoke before of the association of the benign and the malignant adenomata side by side in the same case, and of the importance of examining each growth removed in order to determine malignancy. Let me here go further and say that the examination for each growth is not complete until sections are examined from their bases, " as it has been found that the superficial portions of the growth do not show any appearance of malignancy, while their base does." (Tuttle.)

Although some probability of confounding carcinoma of the rectum with proliferating proctitis exists, the latter generally has a history or some symptoms of syphilis; the dis-

ease is uniformly distributed throughout the rectum; diarrhœa is also present from the beginning, the discharge of mucopus is abundant; the protruding granulations are also soft to the touch and without any indurated edges.

To distinguish between a simple fibrous stricture and a scirrhous carcinoma is very difficult, except by microscopic examination after excision. Difference in locality is probably one of the most distinguishing features. The scirrhus rarely appears in the rectum, while fibrous stricture is quite as rare in the sigmoid. It would not be well, however, to place much dependence on this distinguishing characteristic. There is a decided difference between the appearance of the mucous membrane over each as seen through the proctoscope. Over scirrhus the mucous membrane appears congested, thickened, or ulcerated; while over fibrous stricture it is pale, smooth, shining, and rarely ulcerated.

Epithelioma of the anus may be mistaken for fissure or tubercular deposits. From fissure it can readily be diagnosed by the small amount of induration beneath the sore. It may readily be differentiated from tubercular deposits by there being no tendency to the formation of sinuses or fistulæ. It is, however, much more satisfactory to rely upon microscopic examinations for a positive diagnosis.

When the carcinoma is situated high up in the sigmoid, and it is impossible to obtain sufficient data through the rectum to make a diagnosis, it is perfectly justifiable to make an exploratory incision into the abdomen for that purpose when serious symptoms justify the procedure. When making such an incision, be prepared to do whatever is necessary for the relief of the patient.

Treatment.—Carcinoma of the rectum and sigmoid presents to the rectal surgeon the most serious and difficult problem in his field of work. In the rapid advance which surgery has made in the last few years it is no longer necessary with an antiseptic technic to weigh the pros and cons of operating, but merely to decide in each individual case whether or not

the malignant growth has advanced beyond that stage of development when a fair hope for prolonged immunity or permanent cure would be effected by its complete extirpation.

The old method of temporizing with these cases by palliative measures is no longer to be tolerated. The question to be decided from the very first, and to be done with as little delay as possible, is shall I operate or not? If inoperable then attention should be turned to making the patient as comfortable as possible. If operable, then an immediate decision should be made as to the operative procedure which will give the best results, *i.e.*, the most complete eradication of the disease, least liability to recurrence, and greatest amount of comfort to the patient.

What conditions will enable us to decide whether or not a case is operable? Surgeons differ so widely as to indications determining this matter that it is a very difficult question.

The technic for the combined perineal and abdominal routes have been so definitely defined and excision by this method so successfully done at all points from the anus to the upper sigmoid, that location of the malignant growth no longer influences the answer. To me it seems to resolve itself into determination of the stage in the development of the malignant growth; the alliances it has made with other organs, and whether there are any metastases.

What has previously been said in this chapter about the different stages of carcinoma of the rectum should enable the surgeon to decide this part of the question fairly well.

If the growth is within reach of the finger, or can be brought down within its reach by counter-pressure on the abdomen, the attachment or extension to other organs, or to the framework of the pelvis, can also be made out fairly well. The mere attachment of the diseased rectum, however, to other organs or to the framework of the pelvis by simple inflammatory adhesions is not sufficient to impair the good results of a complete excision, but it is necessary the malignant growth should have extended to and involved the attached organ or

pelvic framework. The decision of this question can only be approximated by the firmness of the adhesions, but it can be more definitely determined by the presence of some of the characteristic symptoms of the malignant growth in the attached organ or pelvic framework. The existence of metastasis, except to the adjoining lymph glands, is not likely to be recognized in the earlier stages, especially as the organ most frequently affected by these secondary growths is the liver, in which its early recognition is difficult.

INOPERABLE CASES.—A case may be said to be inoperable when the rectum or sigmoid is firmly attached to its neighboring organs or to the general framework of the pelvis; when the neighboring organs or the general framework of the pelvis shows evidences of involvement by the malignant growth, or the adjoining lymph glands—those in the line of extension of the disease—are enlarged, or when there are evidences of a general involvement of the system, either by the direct effects of the malignant growth, as by numerous metastases, or by its secondary effects as general septicæmia.

Palliative Treatment.—When a case is decided to be inoperable, attention should be turned towards making the patient as comfortable as possible, and mitigating the ill effects of the disease both local and constitutional. This is the only class of cases in which palliative treatment is admissible, except when it is needed preparatory to an extirpation.

The patient's diet, while varied, consists of articles least irritating to the ulcerated surfaces of the tumor, nor likely to form hard scybalous masses, yet at the same time very nutritious; milk is prohibited, except in very moderate quantities with fruits and cereals, on account of its tendency to form hard scybalous masses; this objection, however, does not apply to buttermilk, which is also more digestible. Eggs, fresh rare meats, fruits (fresh and cooked), and such vegetables as do not contain much coarse cellulose can be given.

Irrigation.—Probably the one most important thing to be done in the treatment of these cases is to keep the rectum

free from accumulations of mucopus, blood, and detritus. This is best accomplished by frequent irrigations (two or three times daily) with plain tepid water, to which some bland and non-irritating antiseptic may be added. Probably the best is boracic acid, one dram of the powder to one pint of warm water, or the same amount of antiseptic powder N. F. The chief point to be gained, however, is washing out the bowel.

If the growth is low down in the rectum the patient should be placed in the left lateral position; if high up and the patient is weak, he should be placed in the same position with the hips elevated and the shoulders lowered, or if he is strong enough the knee-chest position would be better. The water should be allowed to run in slowly, and when the bowel is full it is best to let the patient evacuate it on the toilet if he is sufficiently strong, as he will empty the contents of the bowel more thoroughly in this position; but if not equal to this, it is better to use a rectal irrigator. If these measures do not relieve the frequent tenesmus and there is much pain, it will be necessary to give opium; but only as the symptoms demand, so as to conserve its effects as long as possible.

In cases of medullary carcinoma and probably in some cases of adenocarcinoma when attended with exhausting hemorrhages, it would be better to curette the growth in order to get rid of the soft pulpy material. The curettage may be followed by hot-water irrigations, in order to control the bleeding.

COLOSTOMY AS A PALLIATIVE MEASURE.—While opinions vary greatly among surgeons as to the propriety of doing a colostomy as a palliative measure, yet there are a group of symptoms which the majority think justify it when present, namely, danger of intestinal obstruction, frequent stools with tenesmus, and bearing down. The surgeon can give every assurance to the patient that these symptoms will be very greatly benefited and much more comfort given. In addition there is a strong probability that the extension of the malig-

nant growth may be much controlled by removing the irritating influence of the fecal matter from the ulcerated surface.

There can be no question of the advantages thus gained for irrigating the entire bowel below the colostomy wound, and thus decidedly lessening the absorption of septic material; nor will the fecal discharges from the colostomy wound be nearly so frequent or troublesome as from the natural passage under existing conditions. I am convinced that such good results call for this procedure far more frequently than it is now taken advantage of.

For the same reasons and under the same conditions entero-anastomosis may be substituted for colostomy, and thus do away with the disadvantages of an artificial anus. This is feasible where there is sufficient healthy bowel below the growth to admit of an anastomosis between the rectum or lower sigmoid and the upper portion of the sigmoid, the cæcum, or the ileum. This operation is chiefly employed for inoperable tumors above the sigmoid flexure.

The procedure consists in a lateral anastomosis between two segments of the bowel, using either Abbe's method or the Murphy button. By either of these methods the portion of the bowel involved in the disease retains its connection with the rest of the intestine and a certain amount of the intestinal contents passes through it. A second method consists in cutting out the portion of the bowel that contains the malignant growth, including several inches of healthy bowel on each side of the growth. The two ends of the diseased portion are invaginated and closed by Lembert sutures. The healthy segments above and below the growth are united by an end-to-end anastomosis, either by suturing them or by using a Murphy button. By the latter method, the diseased portion of the bowel is cut out entirely from the fecal current.

With regard to the X-ray as a curative measure in carcinoma of the rectum, one which gave so much hope from the good results derived in the treatment of skin epitheliomas, it has been found after repeated trials to have positively no

effect in retardation, or in any way suggesting curative action where the growth extends above the anal-margin. Radium has been found equally inefficient in the treatment of cancer of the rectum.

OPERABLE CASES.—A case is said to be operable when the malignant growth is confined to the rectum or sigmoid, regardless of its location in any part of them and where there are no evidences of metastasis in other organs.

An operation for carcinoma of the rectum always implies an excision or a resection of the affected parts. The propriety of such a procedure in properly selected cases, as above designated, is now thoroughly justified by both immediate and remote results following the modern methods. The route to be selected depends upon the location of the malignant growth, and this in turn materially affects the success of the operation.

The different routes selected are the perineal for carcinomas low down, the mortality of which is comparatively low; the sacral for carcinomas in the upper rectum and lower sigmoid, the mortality of which is fairly low, if the operation is done only in those cases in which the growth is confined to the rectal wall; the abdominal for carcinomas in the middle and upper portion of the sigmoid; and lastly, the combined sacral and abdominal route for those cases in the upper rectum and lower sigmoid which are rather over the border-line of strictly operable cases, made so by inflammatory attachments to the adjoining organs or pelvic framework, but in which the malignant growth has not extended to them.

The technic of these different routes will be taken up in detail in the succeeding chapter. I only discuss here the results in general of operations by these different routes to ascertain if results justify the claims recently made for operation. Tuttle has shown in his " Diseases of the Anus, Rectum, and Pelvic Colon " (page 785) a mortality of 20.2 per cent. from a total of 1578 cases of extirpation of the rectum done since 1880, and collected from literature and private communica-

tions. This Tuttle asserts is practically the conclusion of Finet, from a collection of three hundred and seventy-five cases.

A paper on "Cancer of the Rectum" read by Tuttle before the American Medical Association, June, 1908, showed a mortality of only 13 per cent. in one hundred cases of excision of the rectum done by himself. There are also other very interesting data in this same paper, which is well worthy of careful perusal, but which cannot be given here in detail.

I would supplement these reports by reference to four cases in my own practice, three on which I did an excision of the rectum for adenocarcinoma, all of which are alive with no recurrence, one after twelve years, one after ten years, and the third after three years; also one case of excision for small spindle-cell sarcoma, who is alive with no recurrence after eleven years.

Enough, I think, has been given to justify the claim made in a previous paragraph for excision in properly selected cases, and the results stand out in bold contrast to the gloomy picture so often presented to those familiar with the usual course of cases allowed to terminate without an operation.

SARCOMA

" A sarcoma is really a cellular tumor of the connective-tissue type, the cells being of the vegetative, imperfectly differentiated order, or embryonic; and the component cells develop and present characteristically interstitial substance. The more embryonic the type of cell-standard, the greater the malignancy. All sarcomas present certain features in common. They are not encapsulated, but exhibit a peripheral growth, and invasion of the surrounding tissues. This invasion is along the tissue spaces and leads to progressive destruction of the pre-existing tissue, with general absorption of all that tissue save a supporting framework around the vessels and capillaries.

" The sarcoma cells, in short, *grow in the immediate neighborhood of the capillaries.* This is a marked feature of all

sarcomas. We observe throughout the tumor that the vessels are composed of a single endothelial layer, immediately beneath which are tumor cells. The capillaries may be widely dilated, in fact, another feature is the *abundant vascularity* of the growths.

" From these relationships it will be readily understood that (1) *hemorrhages* into the tumors are very apt to occur, and (2) that sarcoma cells are liable to become free in the blood-stream, and that *metastases along the blood-stream are characteristic of these growths.* Such metastases, it must be remembered, are not confined to the vascular system; they may occur along the lymphatics, so that malignant enlargement of superficial and other lymph glands is not absolutely diagnostic of cancer.

" But extension by the blood-vessels is undoubtedly the commonest procedure, and thus it is that a secondary sarcomatous growth is peculiarly apt to show itself in the lungs. So also it must be noted that the growth may directly invade and grow along the blood-vessels.

" The frequency with which sarcomas are melanotic is not, as has been supposed, due to the thinness of its blood-vessel walls, and thus to any relationship between the melanin and hæmoglobin, but the modern view regards the melanin as a derivative from nucleolar matter of the nuclei of the melanin-bearing cells (Rössle, Meirowsky, Staffel), associated with distinct signs of nuclei exhaustion, not to say degeneration. It may well be that the extraordinary deposit of melanin in melanotic tumors, far from being a progressive acquirement, indicates a deficiency in the disintegrative mechanism of the cell, whereby the normal final stage of colorless chromogen formation, or of protein disintegration, is not reached." (Adami.)

So frequent are melanotic sarcomas in the rectum, that they stand in the ratio of two to one to non-melanotic; whereas melanotic carcinomas in the rectum are very rare.

" The species are determined according to the prevailing type of cell: thus we have round-celled and spindle-celled sarcomata; some contain pigment, and are known as melanosarcomas. Of each of these there are one or more varieties, which have received qualifying names, such as lymphosarcomata, myosarcomata, chondrosarcomata, etc." (J. Bland-Sutton.)

Sarcomata as found in the rectum are irregular deposits beneath the mucous membrane; their surface is rough and unequal, and the mucous membrane is movable over the growths in their early stages, but subsequently it may become adherent to the growth, through inflammatory processes. They may be single or multiple, and are generally sessile and may become pedunculated as the result of traction by the peristaltic movements of the bowel, or from their own weight. or they may appear as a circumscribed fibrous thickening of the wall of the bowel.

Varying in size from one to four or five inches in diameter, they are not so dense as scirrhous carcinomas, except in cases of fibro-osteosarcomas.

When melanotic they appear as black gangrenous masses, although when multiple one tumor may be melanotic while the other may present the ordinary color of mucous membrane.

They may appear in any portion of the rectum or sigmoid (the only case operated upon by myself was located in the lower portion of the sigmoid), but are generally located in the lower portion of the rectum, or in the anal canal.

They increase in size much more rapidly than do carcinomas, and prove fatal much sooner.

According to Ziegler, the sarcomas possess no lymph vessels proper, only occasional lymph spaces and channels. Notwithstanding, we sometimes find enlargement of the adjoining lymph glands, which is said to be more frequent in sarcomas of the rectum, but the fact must not be overlooked that metastasis from sarcoma usually takes place through the blood-vessels, especially the veins. These metastases in sar-

coma are not only very frequent, but likely to involve many of the organs. In sarcomas of the rectum, the liver stands in the direct line of infection through the portal circulation, and therefore is most frequently the seat of secondary infection.

Sarcomas of the rectum may be either primary or secondary, the latter as a result of metastasis from tumors elsewhere in the body.

The types of sarcoma most frequent in the rectum are the *round-cell, spindle-cell,* and *alveolar.*

Hemorrhages occasionally occur in these tumors, owing to the thinness of the blood-vessel walls, the dark appearance of which must not be mistaken for melanosis.

Age.—While the majority of cases of sarcoma occur after middle life, yet they do occur in very young children.

Symptoms.—The early symptoms are very similar to those of any growth, probably at first a fulness, with a disposition to bear down, a discharge of mucus, sometimes blood; in the later stages the bleeding may be very excessive, but not, however, until degeneration sets in, after which there is also a considerable discharge of pus. Protrusion of the tumor if pedunculated, or located directly at the anal margin, is not uncommon.

There is never any very pronounced odor in the discharge, even after ulceration of the growth has set in, such as found in carcinoma of the rectum.

Pain.—The amount of pain attending sarcoma of the rectum depends largely upon its location. If low down in the rectum, especially if involving the sphincters, the pain is very severe, but if high up in the rectum or sigmoid the pain is likely to be very slight.

The condition of the bowels varies with the stage of the growth and its location. Where there is much pain, increased by the act of defecation, the patient is likely to restrain his movements and the bowels are apt to be constipated, but during the later stages, attended with ulceration, there is likely to be diarrhœa.

Cachexia is not likely to be nearly so marked as in carcinoma.

DIAGNOSIS.—The infiltration of the walls of the bowel in sarcoma does not extend as far out around the growth as in carcinoma. In the early stages of sarcoma, the fact that the mucous membrane moves easily over the growth is a characteristic condition which distinguishes it from carcinoma. But the most certain method of making a diagnosis is by a microscopical examination of a section taken from the body of the tumor and not from its mucous covering.

Treatment.—This consists in a radical excision of the growth, the incision for which should extend well beyond the base of the tumor, and even include excision of the rectum, if the growth involves much of its walls.

The technic of the latter procedure will be considered in the chapter on Extirpation.

As in carcinomata, except in epithelioma of the anal margin, the X-ray or radium treatment offers no hope in the treatment of sarcomas.

Prognosis.—The prognosis is most grave, even in cases operated upon, as metastases are likely to take place early in the disease and prove rapidly fatal. The case of a spindle-cell sarcoma, probably the least malignant type, of the lower sigmoid, on which the author did an excision, has however survived eleven years without any recurrence of the disease.

CHAPTER XVI

EXTIRPATION OF THE RECTUM

THIS, so important an operation, demands a separate chapter.

Practised for nearly two centuries, it was not until after the introduction of antiseptic surgery that its success was sufficient to encourage its being performed, and up to 1876 the operation was confined to growths low down in the rectum and was performed either through a perineal incision or the anus itself.

Verneuil, at the suggestion of Amussat, first practised the removal of the coccyx to obtain more room for the removal of the tumor. The operation obtained very little popularity until Kraske read his paper before the Fourteenth Congress of German Surgeons in Berlin in 1885, in which he suggested the removal of a portion of the sacrum for this purpose. Following his suggestion, many notable surgeons advocated removing even larger portions of the sacrum, until it included the entire bony floor of the pelvis. The rebound from this extreme was championed by such men as Billroth, Levy, and others, who substituted bone-flaps containing the coccyx and lower segments of the sacrum, which were to be sutured back in position after the rectum was extirpated.

This was followed by a suggestion from Desguins to employ the vaginal route in extirpating malignant growths of the rectum (*Annales de la soc. de med. d'Anvers,* September, 1890). Price (*Med. and Surg. Reporter,* May 16, 1896) and Arthur (*Amer. Jour. of Obstet.,* Vol. XXIV, page 567) had previously made use of the vagina as a point for the implantation of the bowel after extirpation of the rectum, where it was impossible to bring it down and suture it to the margin of the anus, but neither of them suggested attacking the growth through this canal.

Subsequently Giordano and Quenu (*Clinica Chirurg. Milano,* 1896, f. 463; *Chirurgie du rect.,* t. ii, page 290) advocated opening the abdomen to loosen the attachments of the upper rectum and sigmoid and to establish an artificial anus; after which the rectum was dissected out, either through the perineal or sacral route. This was known as the combined method of extirpating the rectum.

Maunsell preceded them by an almost similar suggestion in 1892, except that after loosening the upper rectum and sigmoid he further advised invagination of the growth through the anus and resection of the growth thus brought outside of the body.

It will thus be seen that there are five general methods of performing extirpation of the rectum, *perineal, sacral, vaginal, abdominal,* and the *combined.*

PREPARATION OF THE PATIENT.—It is very necessary that this should be done carefully, as results depend much upon it. The patient's strength and general condition must first be considered, due care being taken to improve it as much as possible. The condition of the bowels must next be most carefully noted. In the majority of cases they will be over-loaded, even though in certain cases there may have been frequent or even constant oozing. In order to avoid any risk of possible rupture of the bowel by a strong cathartic in case the growth has produced a stricture with ulceration of the coats of the bowel, it is better to give moderate doses of a gentle laxative, either castor oil or compound liquorice powder, and repeat this frequently until the bowels are thoroughly emptied.

The diet must be so regulated as to be as concentrated, nutritious, and devoid of refuse as possible. Milk should be restricted, or better omitted, on account of its tendency to produce hard scybalous masses; buttermilk, however, may be substituted. Eggs may be allowed with a small quantity of meat (better fish) and bread. The food should be given in small quantities, and at frequent intervals. An effort should

be made to disinfect the intestinal canal from above, by giving salol or beta-naphtol, in x grs. doses, or sulphocarbolate of zinc, grs. ii, three or four times daily between meals.

Let the rectum be irrigated from two to three times daily with mild antiseptic solutions, as antiseptic powder N. F. one dram to one pint of water, or the same strength of boracic acid. These should be given in the knee-chest position or with the hips well elevated. These preliminary preparations should be begun and continued for four or five days, or even a week, if the time can be afforded prior to the operation. The usual toilet just previous to the operation must, of course, be made, when the rectum should be irrigated with a solution of formalin 40 per cent., using ℥i to 1 quart of tepid water.

The practise of making a temporary artificial anus for the purpose of obtaining more complete asepsis in the portion of the bowel to be operated on, so frequently done a few years ago, is now being abandoned, principally on account of its curtailing the length of bowel that may be needed below to replace the excised portion, and on account of its necessitating two distinct operations (opening and closing of the artificial anus) in addition to that for the excision of the growth. Bloodgood, of the Johns Hopkins Hospital, reflects the present advanced views on this subject in the following paragraph:

" Colostomy has been performed too frequently as a primary operation. It is not indicated unless the patients are first seen in a condition of acute obstruction, or their condition is so critical from chronic obstruction that a prolonged operation is contraindicated. If possible, the entire operation should be performed at one sitting."

There is a certain class, however, in which it may be best to do a temporary colostomy, as in cases where it is not likely that the operator will be able to bring the bowel down from above and suture it to the margin of the anus. The propriety of doing a permanent colostomy in inoperable cases of cancer of the rectum is not to be considered in this connection. In those cases, where a temporary colostomy is thought advisable,

it should be done for ten days or two weeks before the proposed operation for excision, in order that the diseased portion of the bowel may be thoroughly irrigated from above prior to the operation.

In cases of soft carcinomas of the rectum, where there is considerable ulceration and breaking down of the tissues, attended by an excessive and very fetid discharge, it would be better to scrape the ulcerated surfaces with a curette several days prior to the operation. This to be followed by a continuation of the antiseptic irrigations.

Perineal Method.—This method is used in extirpation of malignant growths of the rectum, within four inches of the anal margin.

Of the various methods suggested from the time of Diffenbach, Velpeau, and Verneuil to the present for performing this operation, that of Quenu, with certain modifications by Tuttle, appeals to me most strongly, as one best calculated to meet modern requirements. The following is their method, with illustrations from Tuttle and certain modifications by the author.

The rectum having been thoroughly irrigated and the external parts properly prepared, the rectum is then lightly packed with dry sterile gauze. The patient is placed in the extreme lithotomy position and the hips well elevated; a circular incision is made through the skin, just below the mucocutaneous border, and this is dissected up through the anal canal just above the external sphincter. A slip-knot loop of tape is thrown around the part of the cylinder thus dissected loose and drawn tight (Fig. 134), the ends being left long for the purpose of traction. The external sphincter is incised anteriorly and posteriorly entirely outside the rectum, the posterior incision being carried back to the tip of the coccyx and well into the retrorectal space; the rectum is dissected from its attachments laterally and posteriorly, the sphincter being left in the skin-flaps, if not involved in the growth; in doing

this the levator ani muscle should be cut off as close to the rectum as possible (Fig. 135). The skin and sphincter muscle having been incised in the median line anteriorly as far as the junction with the scrotum, the rectum is drawn backward and dissected loose anteriorly up to the level of the levator ani, which is much higher here than posteriorly. The finger is then introduced from behind forward above the anterior fibres
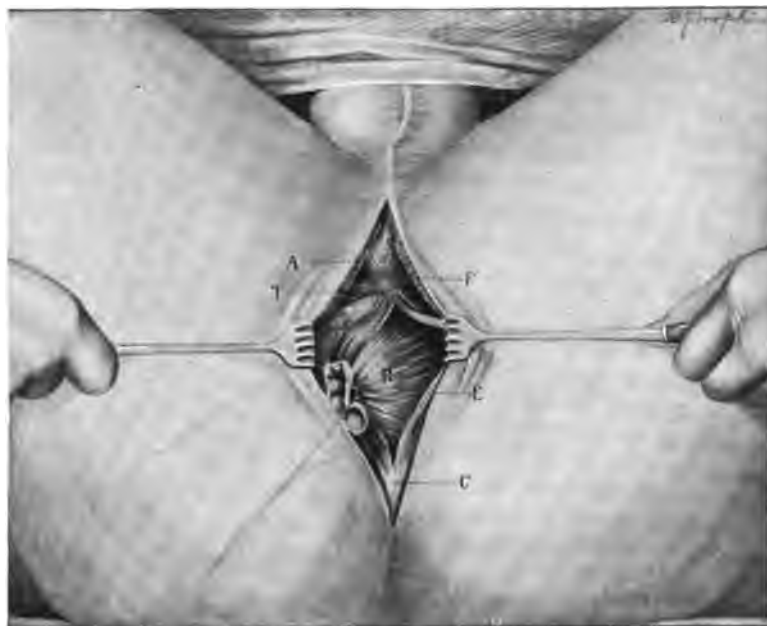
FIG. 134.—Perineal extirpation of the rectum (Quenu's method). *R*, rectum; *E*, external sphincter; *C*, coccyx; *T*, transversus perinei muscles; *A*, bulbous urethra. (Tuttle.)

of the levator ani and the deep perineal fascia, and by gently dragging downward these are separated from the rectum in the lines of cleavage. When this has been accomplished on both sides, the anterior attachment of the levator and ano-bulbar raphe to the rectum are cut through upon the finger, and the organ thus freed in its entire circumference. This accomplished, the operator reaches the superior pelvirectal spaces filled with cellular tissue, from which the rectum can

be separated by the finger until the peritoneal cul-de-sac is reached in front. At this point the lateral connective-tissue folds which support the rectum on the sides must be clipped with scissors, and then the gut will descend well outside the wound. Sometimes the peritoneum can be stripped off from the rectum and its cavity need not be opened; it is better, however, to open the cavity at once when the growth extends

Fig. 135.—Perineal extirpation—loosening rectum from anterior perineal rhaphe. L, levator ani; R, rectum; M, rhaphe. (Tuttle.)

above this point. Before doing this it is well to disarticulate the coccyx and fold it backward in order to obtain more room and separate the rectum from the sacrum by breaking up the cellular and fibrous attachments with the fingers. The peritoneum is then incised (Fig. 136), cut loose from its attachments close to the rectum back to the mesorectum, which should be cut close to the sacrum in order to avoid wounding the inferior mesenteric artery. When the bowel has been loosened

sufficiently above the tumor to be brought down and sutured to the anus, one should proceed to close the peritoneum and restore the planes of the pelvic floor down to the levator ani by fine cat-gut sutures. The rectum is then amputated through healthy tissue at least one inch above the tumor, and its upper end sutured at the original site of the anus on each side. The posterior and anterior portions of the perineal wound are
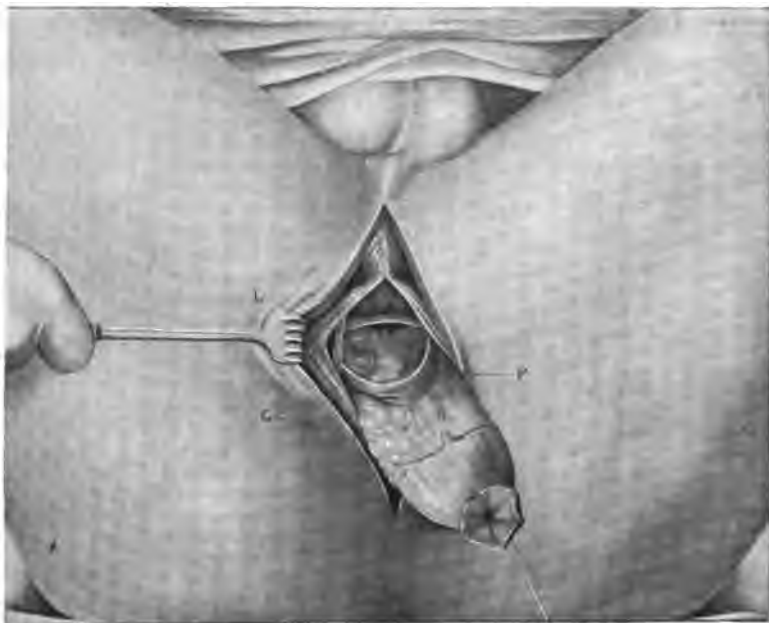
Fig. 136.—Perineal extirpation—the peritoneal pouch laid open.   (Tuttle.)

closed with stout silk sutures and a cigarette drainage-tube is introduced at each extremity of the wound to insure drainage (Fig. 137); the parts are covered with aseptic pads held in position by a well-fitting diaper or broad T bandage. A large drainage-tube is passed well up into the rectum, its lower end extending outside of the dressings in order to convey the discharges and gases beyond the operative wound. This procedure is applicable in the female, but it is somewhat difficult

to avoid wounding the vagina, and there is always danger of infection from this organ during and after the operation. It does not appear to possess any advantages in women over the vaginal route.

In incising the peritoneum, it is Tuttle's practise to begin at the lowest portion of the anterior cul-de-sac and cut close to the intestine up to the mesorectum. From this point upward

Fig. 137.—Perineal extirpation completed. *U*, tampon and drainage-tube in anus. (Tuttle.)

he incises the peritoneal fold as close to the sacrum as possible; first, because it avoids the danger of wounding the superior hemorrhoidal artery, and second, because it removes along with the growth all glandular enlargements in the meso-rectum. It can be well understood that the operation is not applicable to cases in which the tumor is isolated well above the rectum, and can be resected, leaving a healthy area of two inches or more between the anus and the growth. In other

words, where resection is feasible, the perineal route is not
to be advised; where amputation is necessary, this route should
be employed.

Sacral Method: Kraske's Operation.—This method con-
sists in removing the coccyx and a portion of the lower end
of the sacrum for the purpose of obtaining easier access to
the upper portion of the rectum and lower sigmoid. Kraske
was the first to carry out the suggestion and all subsequent
suggestions involving the removal of the lower portion of
the sacrum are modifications of his original method.

I do not stop to review these various modifications, but
give Tuttle's modification of Rehn and Rydgier's operation,
with certain suggestions from myself. Our chief reason for
adopting this method is because it involves injury to the sacral
nerves and lateral sacral arteries of one side only; it furnishes
the most satisfactory access to the portion of the bowel to be
removed, and restores the bony floor of the pelvis and the
attachment of the anal muscles.

After the patient is prepared, as before suggested, the
rectum should be packed with absorbing gauze, more espe-
cially for the purpose of keeping the operator's fingers out
of it. The patient is then placed in the left lateral position
with the hips well elevated. An oblique incision is made from
the level of the third foramen on the *right* side of the sacrum
down to the tip of the coccyx, from which it is extended half
way between this point and the posterior margin of the anus.
After the incision reaches the cellular tissue posterior to the
rectum, the latter is rapidly separated by the fingers from the
sacrum, and the space thus formed together with the wound
should be firmly packed with sterilized gauze (Fig. 138). A
transverse incision is then made, at the level of the fourth
sacral foramen; this should extend down to the bone, which
must be rapidly cut through with a chisel in this line, after
which the triangular flap is pulled down to the left side, and
held there (Fig. 139). At this point it is usually necessary

to tie the right lateral and middle sacral arteries. If the first incision should have extended too far away from the sacrum, the right sciatic artery may be cut.

Let the rectum now be isolated from the surrounding organs below the level of the resected sacrum so that a ligature can be thrown around it, or a long clamp applied to control any bleeding from its walls (Fig. 140). If the growth

Fig. 138.—Extirpation of the rectum by the sacral route—first step in the bone-flap operation. (Tuttle.)

extends to or above the peritoneal attachment of the rectum, the peritoneal cavity must be opened at once, as it will be found much easier to dissect the rectum out by following the course of the peritoneal folds. These latter should be incised close to the rectum (Fig. 141), to avoid the danger of wounding the uterus and to facilitate dragging the rectum down. When the mesorectum is reached, the incision should be carried as far away from the rectum and as close to the sacrum

Fig. 139.—Showing the rectum and adjoining parts with the principal vessels after the bone-flap has been turned down.

as possible, in order to avoid wounding the superior hemor-
rhoidal artery and to remove all the sacral glands.   The bowel
should be loosened and drawn down until the healthy portion
above the growth will easily reach either the healthy segment
below it or the anus.   The peritoneal cavity should now be
cleansed by wiping with dry sterilized gauze and then closed
by sutures, attaching the membrane to the bowel.   Let two
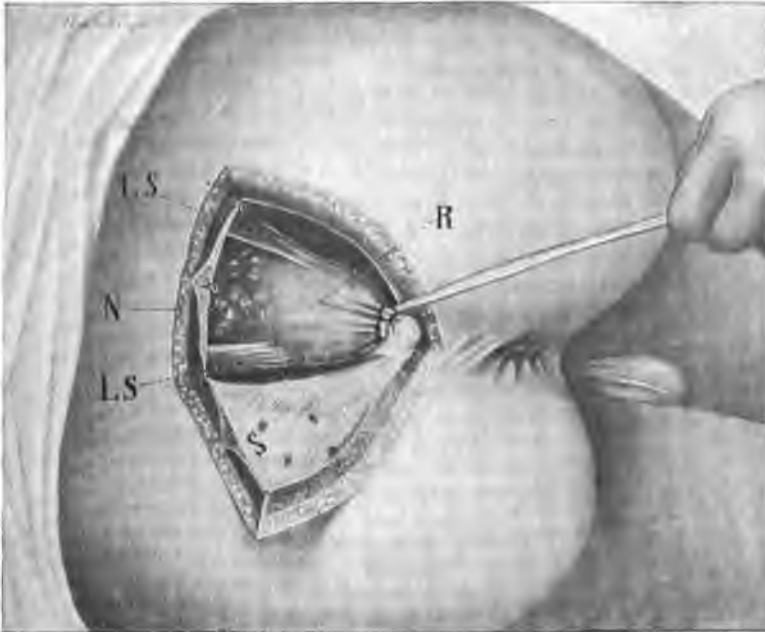
Fig. 140.—Second step in bone-flap operation.   R, rectum; N, neoplasm; LS, lateral rectal
ligaments; S, sacrum.   (Tuttle.)

intestinal clamps with the blades protected by rubber be applied
to the healthy portion of the rectum about one and a half
inches below the growth, so that when the bowel is excised the
incision should pass only through healthy tissue.   The dis-
eased portion of the bowel is now cut across between the two
clamps, the ends being carefully wiped, first with sterile gauze,
then with alcohol; and covered with rubber protective tissue.
The lower segment containing the growth is then dissected

from above downward in an almost bloodless manner, the superior hemorrhoidal vessel first having been clamped, much more easily removed in this direction than from below upward. If the neoplasm extends within one inch of the anus it will be necessary to remove the entire lower portion of the rectum, together with the mucous membrane from the anal canal (tak-
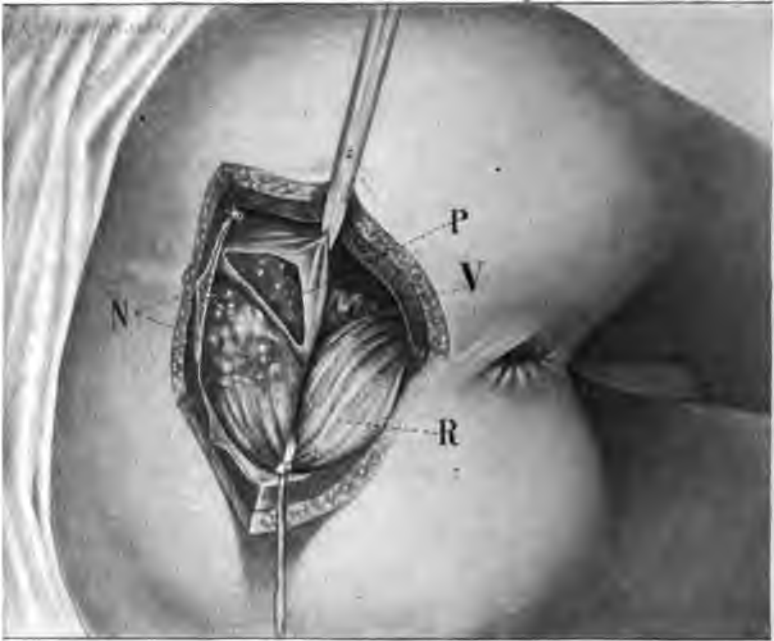
FIG. 141.—Third step in bone-flap operation. *P*, opening in the peritoneum; *V*, seminal vesicle and bladder; *N*, neoplasm; *R*, rectum. (Tuttle.)

ing care to leave the sphincter muscle) ; invaginate the upper end of the intestine through the anal canal, and suture it to the skin around the anal margin.

If more than one inch of healthy bowel remains above the anus, the proximal and distal ends of the bowel should be united by an end-to-end anastomosis, using sutures to unite first the ends of the mucous layer, then the submucous with the muscular layer and the serous layer, if the bowel has been

cut off above the attachment of the peritoneum (Fig. 142). Little if any tension should be employed in bringing the bowel down to the required position, as such a condition if allowed to exist will cause the sutures to cut out and the bowel to retract. After the ends of the bowel have been united, or the proximal end attached to the anal margin, a large silk anchor-suture is passed through the skin to one side of the
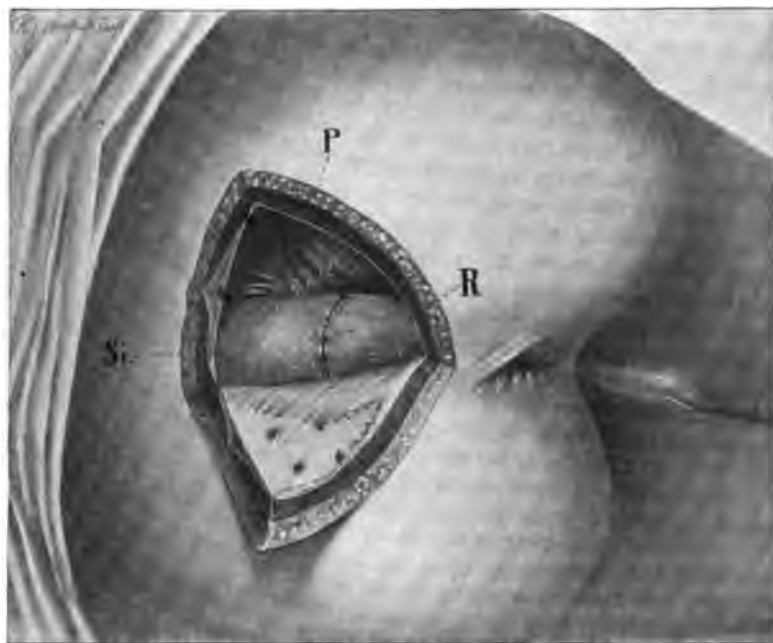
Fig. 142.—Fifth step in bone-flap operation. The growth has been resected and the ends of the intestine have been sutured together. (Tuttle.)

anal margin, and posterior to it up through the mesorectum, about three inches above the anus, and out again through the skin on the other side of the anus posteriorly; it is then tied. This is used to prevent too much tension on the sutures and retraction of the bowel.

It was formerly thought that in certain cases it was impossible to get sufficient bowel down from above to reach the anal margin. In such cases it was therefore recommended to attach

the proximal end of the rectum at a higher level in the wound, thus forming what is known as a sacral anus (Fig. 143).

I have one such case living on which I operated for sarcoma eleven years ago. It has since been demonstrated that sufficient bowel can be drawn down from above in almost every case, by cutting up the mesorectum sufficiently far, so that such a necessity need not now arise. All oozing is checked
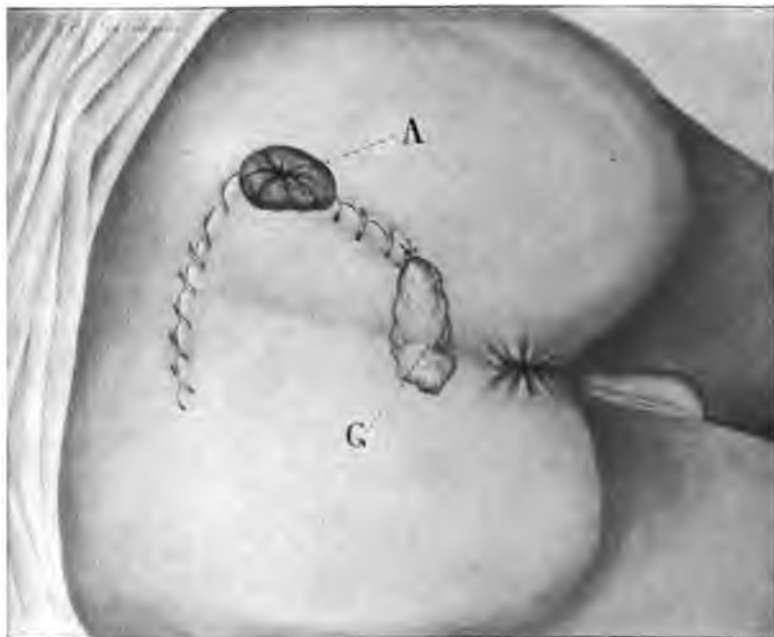
FIG. 143.—Sacral anus. (Tuttle.)

by hot compresses, a drainage-tube is inserted on each side of the rectum near the points where the ends have been united, and brought out at the lower angle of the wound; the bone-flap is fastened back in its original position by silkworm-gut sutures, which pass deeply through the skin and peritoneum on each side of the transverse incision. The lateral portion of the wound is closed by similar sutures drawn down to the level of the sacrococcygeal articulation; below this it is left open

for drainage-tubes. A large drainage-tube is carried up through the bowel beyond the line of intestinal sutures, and the wound covered with sterile gauze held in position by adhesive straps sufficiently tight to make firm pressure over the bone-flaps, and a T bandage made with a folded towel placed over this. Further pressure on the bone-flap is effected by placing the patient upon his back or right side, the head of the bed being slightly elevated in order to facilitate drainage, and the escape of blood should there be any hemorrhage, especially to prevent a concealed hemorrhage escaping upward into the peritoneal cavity. Usually there is considerable oozing for the first twenty-four hours following the operation, during which time the outside dressings should be changed.

As soon as the patient's strength is sufficient he should be encouraged to get on his feet, in order to drain the parts more easily and also that the weight of the abdominal organs may press the pelvic floor backward against the sacrum, and thus hasten the filling in of this cavity.

Let him be kept upon a concentrated liquid diet, and his bowels confined by opium, unless a preliminary artificial anus has been made, after which they are moved by an enema of oil and glycerin.

The objections urged against this operation are, that the bone does not reunite and necrosis is likely to occur. This is answered by Tuttle and corroborated by the author's experience. Neither of us have seen a single case of necrosis following the bone-flap operation, and in every case in which we have employed it the bone has reunited in fairly accurate position. My own objection is the amount of shock that is likely to follow this operation.

Vaginal Method.—While extirpation of malignant growths of the rectum through the vagina was first done by Desguins (*Annales de la societe de med. d'Anvers*, 1890) and by Norton (Trans. Clin. Soc., London, 1890), yet there was no clear and well-defined technic laid down for doing the operation until that suggested by Murphy, of Chicago.

I had employed the vaginal route for excising malignant growths of the rectum in two cases, before Dr. Murphy published his technic. This route was selected by myself in each case because the vagina had become involved in the malignant growth; at least it was firmly adherent to the rectum, although the vaginal wall had not broken down. In the first case, the operation was more satisfactorily done and the patient made a more rapid recovery (the wound uniting by first intention) than any case I have operated on before or since, yet there was a recurrence at the primary seat of the disease within three months, and although I did a second operation death from the disease occurred within a year. While the second case was not so satisfactory in its primary results, and the malignant growth had involved the vagina to a greater extent, yet I was careful to extend the incision well beyond the malignant growth. Nevertheless it returned in the primary seat of the disease within two months from the time of the operation, and the patient died from the disease within a year, notwithstanding the second operation. I have since learned that where the vagina has become involved in malignant growths of the rectum recurrences are very frequent, on account of the extensive chain of vascular and lymphatic vessels that exist between the two in the perineal body. This has certainly been my experience in such cases.

Tuttle says that up to 1897 most operators confined this method to tumors in the middle and lower portions of the rectum, but with the development of the vaginal method in gynæcological operations it became more and more apparent that even the uppermost portion of the sigmoid flexure could be reached and extirpated by this route. The method is therefore no longer limited to the rectum. Except in cases where the vaginal wall or uterus is involved, there is no great advantage in the vaginal route over the perineal and bone flap operation described above. It requires more time, there is a greater loss of blood, and more danger of infection through uterine discharges and dripping of urine than in the sacral operation.

The technic of Murphy's operation, with modifications by Tuttle, is as follows: The patient is placed in the lithotomy position with her hips slightly elevated. A semicircular incision is made between the anus and coccyx, and extending into the retrorectal space. With the fingers or a dull instrument the cellular tissues and rectum are separated from the anterior surface of the sacrum and coccyx as high up as the wound extends. After this has been accomplished, the wound and sacral concavity are packed with iodoform gauze to control the oozing. The site of the tumor determines whether the peritoneum should be opened or not. The vagina is dilated with broad retractors, the cervix drawn down, and Douglas's cul-de-sac opened by a transverse incision just below the cervical juncture. The small intestines are pushed upward out of the way, the peritoneal cavity packed with large laparotomy sponges or pads, a careful count being kept of the number used. The rectovaginal septum is then divided by a vertical incision in the median line, extending from the first incision down to the margin of the anus, and including the external sphincter (Fig. 144). The vaginal wall is dissected from its attachments to the rectum, thus exposing this organ in its entire length and enabling one to examine it and drag down the sigmoid flexure almost at will (Fig. 145). When the bowel has been drawn down sufficiently for the healthy tissue above the growth to be attached below, close the peritoneal cavity by sutures before opening the bowel, which is now clamped with two intestinal clamps one inch and a half above the growth and cut across between the clamps, the cut ends being carefully wiped with dry gauze and alcohol. The distal ends of the bowel with the growth is now dissected out from above downward, as in Kraske's operation, which has been made much easier by the separation of the rectum from the sacrum in the first stages of this operation. The semicircular incision between the anus and coccyx also furnishes the most satisfactory drainage in case of leakage. Now clamp the bowel one and a half inches below the growth and

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cut off; unite its proximal and distal ends with ten-day chromicized cat-gut, and close the wound, drainage-tubes being introduced in the anococcygeal and vaginal wounds.

While the vaginal route is a most useful addition to those previously described, it offers no decided advantage over them,
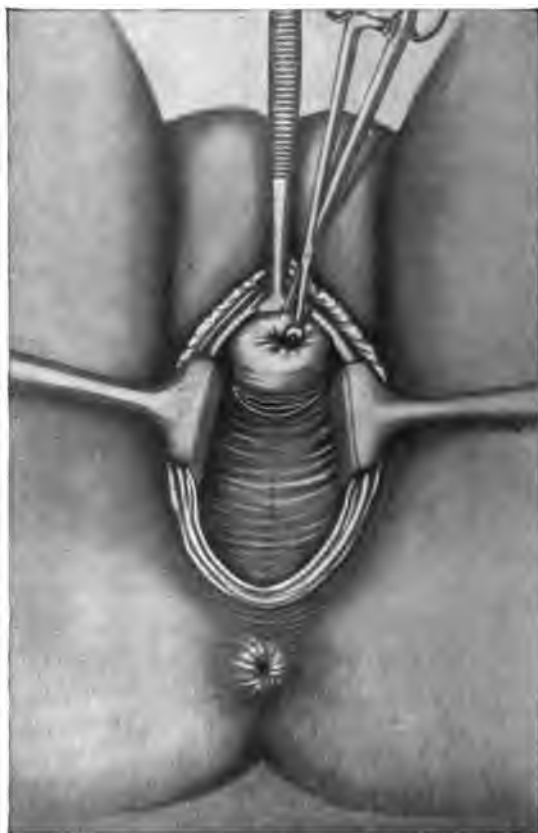
FIG. 144.—Incision in vaginal extirpation. (Murphy.)

except in those cases where the vaginal wall or the uterus are involved, or there is some special reason for not performing either of the others.

Abdominal Method.—Where the malignant growth is limited to the sigmoid and more especially to the movable portion

of it, and can be brought outside of the abdominal wound, this method is the only one to be recommended. Let resection be made according to the recognized methods of intestinal surgery, doing either an end-to-end or a lateral anastomosis by suture.
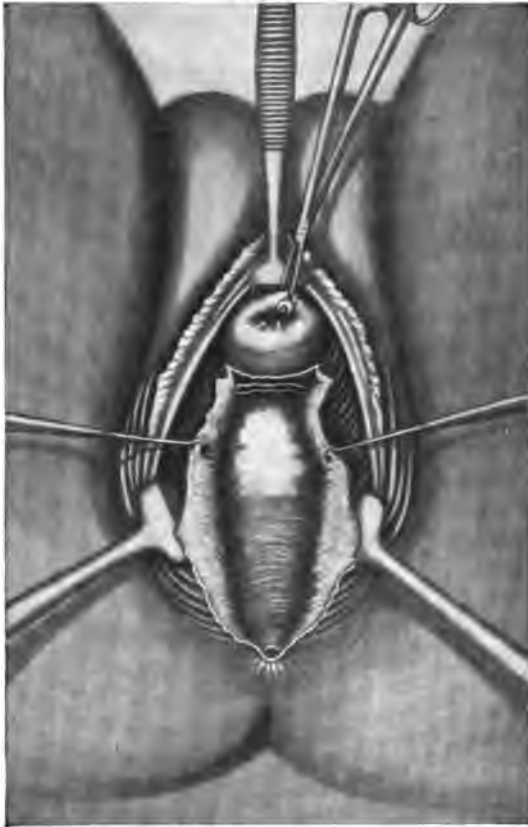
FIG. 145.—Separation of rectum from vaginal walls.   (Murphy.)

When the tumor is low down in the sigmoid it will be well to resort to a device recommended by Howard A. Kelly in 1895, of resecting the upper portion of the rectum and a portion of the lower sigmoid, then invaginating the proximal end of the latter through a longitudinal slit in the anterior

wall of the rectum in Douglas's cul-de-sac; thus the peritoneal surface of the sigmoid will be held in contact with a comparatively wide surface of the peritoneum covering the rectum (Fig. 146). The upper end of the resected rectum was invaginated and closed by Lembert sutures.

FIG. 146.—Colorectostomy (Kelly) or invagination of colon through a slit in the anterior wall of tne rectum.

Combined Method.—In the majority of cases of malignant growths in the upper portion of the rectum or lower sigmoid, instead of resorting to the expedient recommended by Kelly in the previous paragraph, it would be easier to loosen the bowel from its higher attachments through an abdominal

incision, and subsequently complete the resection by the peri-
neal or sacral routes.

With regard to the combined method there are certain
general directions which experience has proved necessary for
successful results, some of which may be formulated in the
following criticisms by Joseph C. Bloodgood, of the Johns
Hopkins Hospital:

" A careful study of the cases in the literature, I believe,
will justify the following criticisms:

" 1. Colostomy has been performed too frequently as a
primary operation. It is not indicated unless the patients are
first seen in a condition of acute obstruction, or their condi-
tion is so critical from chronic obstruction that a prolonged
operation is contraindicated. If possible, the entire operation
should be performed at one sitting. 2. It is unnecessary to
ligate the vessels so far from the mesenteric border of the
colon. Resection of the glands up to this point is not indi-
cated. If they are involved, my experience demonstrates that
the condition is hopeless for an ultimate cure. The disadvan-
tage of ligating the vessels so far from the colon is that, after
such a ligation, a more extensive resection of the large intes-
tine is necessary to leave the bowel with proper circulation.
3. Too much bowel below the tumor is removed.

" If one restricts the resection of the large intestine above
and below the growth to that necessary only for the complete
removal of the disease, and ligates vessels as they are met with
in the proper dissection of the mesentery, with its glands and
the fat between the rectum and the sacrum, it will be possible,
in a large number of cases, to restore the continuity of the
bowel by an end-to-end anastomosis.

" The pathological examination of a number of specimens
and of the zone of mesenteric involvement which I have made
apparently confirms the statement in the previous paragraphs.
That is, in this somewhat restricted operation the new growth
is given sufficient margin, at the same time the circulation of

the remaining portion is not impaired, and in the majority of cases there may be restoration of continuity.

" When the tumor involves the rectum below the promontory of the sacrum, at which position the posterior portion of the bowel has no peritoneal coat, it infiltrates quickly through the wall of the bowel into this tissue. The complete removal of all the tissue between the rectum and sacrum should never be restricted. There is every evidence to indicate that this is accomplished by the combined method better than by the sacral route alone."

These criticisms we consider very conservative and agree with our own views and experience. They are in strong contrast to those expressed by W. Ernest Miles (*London Lancet,* 1908, Vol. II, page 1812), in which he says, " so far as he has been able to gather from the literature on the subject, the technic of previous operators seems to have failed in one important respect, namely, the complete eradication of the zone of upward spread of the cancer from the rectum, whereby the chance of recurrence of disease above the field of operation can be diminished, if not entirely obviated." In his own personal experience of fifty-seven such perineal operations, recurrence took place within periods ranging from six months to three years in fifty-four instances.

For the purpose of ascertaining the cause of failure, he made post-mortem examinations of such of his patients as had died of carcinoma of the rectum, and found that the recurrence appeared in situations beyond the scope of removal from the perineum, namely, (*a*) the pelvic peritoneum, (*b*) the pelvic mesocolon, and (*c*) the lymph nodes situated over the bifurcation of the left common iliac artery.

He compared these findings with the condition of those who had died from inoperable cancer of the rectum, and found that the disease invariably extended by continuity of tissue along the parietal attachment of the pelvic mesocolon, and in the adjacent parietal peritoneum for about one inch on either side of it, as far as the group of lymph nodes situated

over the bifurcation of the common iliac artery. In all cases thus examined, the infiltration of the parietal border of the pelvic mesocolon had caused shrinkage of the pelvic mesocolon itself, whereby the pelvic colon appeared to be bound down, a condition which readily explains the difficulty in obtaining a satisfactory spur when performing colostomy in an advanced case of cancer of the rectum. He therefore considers this area to constitute the zone of the upward spread of cancer of the rectum, and the removal to be just as imperative as the thorough clearing out of the axilla in cases of cancer of the breast, if freedom from recurrence is to be obtained.

The appreciation of this important fact induced him, two years ago, to abandon the perineal method of excision of the rectum, and to substitute an abdominal method, comparable to those methods of performing abdominal hysterectomy, known as the Wertheim and the Krönig-Wertheim. I give the summary of what he considers the essentials of his operation.

He has formulated what he considers certain essentials which must be strictly adhered to if satisfactory results are to be obtained, namely: (1) an abdominal anus is a necessity; (2) the whole of the pelvic colon, with the exception of the part from which the colostomy is made, must be removed, because its blood-supply is contained in the zone of upward spread; (3) the whole of the pelvic mesocolon below the point where it crosses the common iliac artery, together with a strip of peritoneum at least an inch wide on either side of it, must be cleared away; (4) the group of lymph nodes situated over the bifurcation of the common iliac artery are in all instances to be removed; and lastly (5) the perineal portion of the operation should be carried out as widely as possible, so that the lateral and downward zones of spread may be effectively extirpated.

It will be seen then that Miles discards the perineal route entirely as an independent one, and does not restrict the combined method to those cases in which the growth is in the upper portion of the rectum or lower portion of the sigmoid,

as generally done, but includes in his method of operating all cases of malignant growths that occur from the lower sigmoid down. His reasons given being the frequent recurrences after removal in his cases, fifty-four out of fifty-seven.

Such has certainly not been my experience with malignant growths within the first five inches of the anal margin, as I can show. Out of eight cases operated upon, three patients are still alive, without recurrence after ten, eleven, and twelve years, and one after three years; this shows a result of 50 per cent. of cures by the perineal and sacral routes, the last one of this group having exceeded the three-year limit.

THE COMBINED OPERATION.—The combined operation consists in loosening the bowel from its attachments within the abdomen, closing the peritoneal floor, and removing the growth either by the sacral or perineal method after the abdomen is closed. The patient is prepared in the usual manner for an abdominal section, and placed in the Trendelenburg position; the abdomen is opened and the small intestines packed off from the pelvic cavity; the sigmoid brought out of the abdominal wound. The peritoneum on each side of the mesocolon is divided and stripped back; this exposes the fat and the vessels; the vessels are ligated, varying with the location of the growth, either the sigmoids, the inferior mesenteric, or the superior hemorrhoidal arteries (Fig. 147). The division of the peritoneum must be carried down on each side of the tumor some distance from it, over the sacrum to the bladder. The division of the peritoneum is not completed between the rectum and the bladder. With a piece of gauze the mesentery and the fat over the promontory of the sacrum are pushed forward, and the middle sacral artery exposed, doubly clamped, and ligated; the sacrum being completely stripped of the tissue between it and the rectum. The patient is now placed in the extreme lithotomy position if the perineal route is taken for the removal of the growth, or in the extreme left lateral position if the Kraske method is to be used. The

rectum is now separated from the surrounding tissues, as before recommended in either the perineal or Kraske method. After this, if the tumor is a large one, and it can be done, cut the bowel off below the growth, between two ligatures,
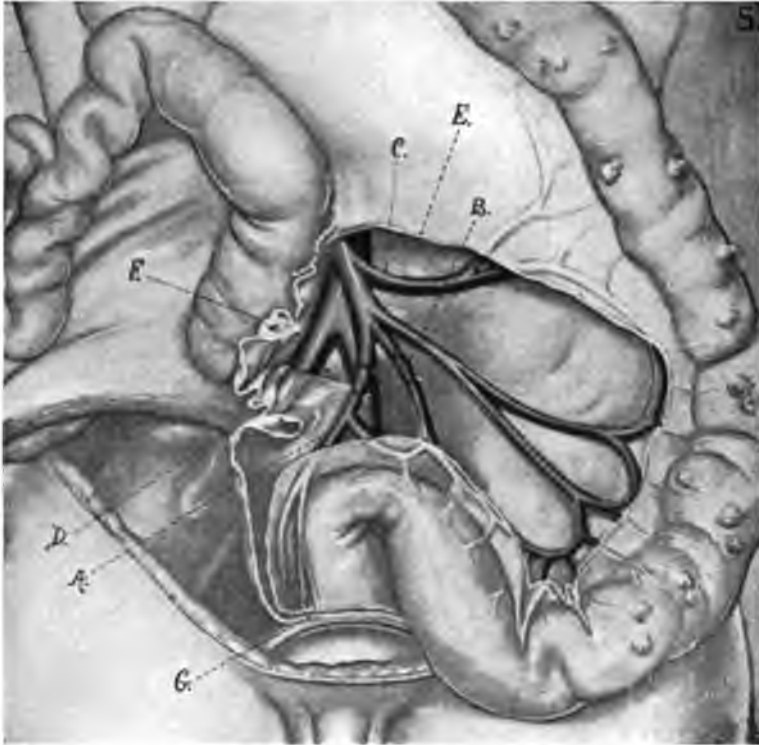
FIG. 147.—Extirpation of the rectum.   (Tuttle.)   Dissection showing peritoneum of the mesosigmoid (F) thrown back and the blood-vessels exposed and ligated so that when they are cut between the two ligatures the sigmoid can be swung down on the upper vessels as radii, thus permitting the removal of almost its entire length along with the rectum, at the same time bringing the cut edges of the peritoneum (FE) together so as to restore the mesosigmoid. A, superior hemorrhoidal artery; B, lower sigmoidal artery; C, left colonic artery; D, internal iliac artery; EF, cut edges of peritoneum; G, incision of peritoneum separating bladder from rectum.

and take it out through the abdominal wound.   If the growth is small the bowel together with the growth must be drawn down and out through the perineal wound, and the peritoneal floor is repaired by sewing together the cut edges of the peri-

toneum, after which the abdominal wound is closed. If the lower portion of the rectum to within two inches of the anal margin is not involved in the malignant growth, the rectum should be cut across an inch below and an inch above the growth, each incision to be made between two clamps, and the proximal and distal ends of the bowel united by an end-to-end anastomosis. If the growth approaches too near the anus for the anastomosis, then the mucous membrane should be dissected from the anal canal, care being taken to leave the sphincter. The bowel with the growth is then drawn down outside the sphincter, cut off one inch above the growth, and the edges of the bowel attached to the skin margin around the anus. In this latter procedure the perineal wound can be closed entirely, but if an end-to-end anastomosis has been done, then it is best to close it only partially, and drain from the point of the anastomosis.

CHAPTER XVII

WOUNDS, INJURIES, AND RUPTURE OF THE RECTUM

WOUNDS AND INJURIES.—The position of the anus and rectum between the folds of the buttocks, as a rule, protects them from injury; notwithstanding there are a sufficient number of injuries of this character to make the subject worth consideration. They may be conveniently arranged into contused, lacerated, punctured, or incised wounds. Contusions arise from falls on the buttocks, prolonged pressure from any cause, and undue manipulation in stretching the sphincter; lacerations, from sharp foreign bodies in the stools, excessive divulsion of the sphincter, and falling or sitting down upon sharp objects; punctured wounds, from gun-shot or bayonet injuries, also from falling on sharp-pointed objects. Urethral sounds have sometimes been the cause of such accidents, but the greatest number have been occasioned by the improper use of syringe tips and rectal bougies. Tuttle records three cases that he has known in which the improper use of the Kelly tube caused perforation of the rectal wall, fecal extravasation, peritonitis, and death. Operations for stone in the bladder by perineal section or for prostatectomy have frequently resulted in injury to the rectum.

Rupture of the Rectum.—This has occurred from the use of the colpeurynter in suprapubic cystotomy. Dragging upon the organ in efforts to break up attachments between it and pelvic growths by the use of force with the nozzle of a syringe, rectal bougies, in pelvic operations, penetrating and punctured wounds, and excessive pressure from the use of compressed air have all resulted in such injuries. Several cases have occurred during attempts to reduce rectal procidentia, and injury has also occurred from the introduction of the hand for diagnostic purposes.

PROGNOSIS.—The gravity of wounds and injuries to these parts depends largely upon the site, the tissues, and organs involved. Where the injury is confined to the anus and rectal walls, the wounds usually heal promptly under antiseptic precautions, except in those cases where the puncture of the rectal wall has taken place within the anal opening, and without injury to it. The majority of such cases that have been reported have proved fatal, most likely due to improper drainage through the closed anus.

The results of gun-shot wounds of the rectum, according to the records of our Civil War and of the Franco-Prussian War, show a mortality of over 40 per cent. Pelvic cellulitis, septicæmia from infiltration, diffuse suppuration, and secondary hemorrhage were the chief causes of death.

Where the bladder is involved and the wound sufficiently large to allow fecal extravasation into that organ, the case is very grave.

The seriousness of any injury to the rectum depends upon its height in the rectal wall, its extent, the form of the body making it, and the length of time elapsed between the injury and the institution of proper treatment. The principal factor in all these cases is the wounding of the peritoneum. Septic peritonitis ordinarily develops within twelve or fourteen hours when the peritoneum is involved, and in a certain number of cases, as shown by Watson, peritonitis has followed a penetrating wound of the mucous wall of the rectum which has not extended to the peritoneum.

Symptoms.—The symptoms of such injuries to the rectum itself speak for themselves; the history, the wound, the loss of blood, the pain, and shock leave no doubt as to the character of the trouble. The extent of it and the involvement of other important parts, especially the peritoneum, require a more careful investigation of symptoms. In the latter case they are those of immediate traumatism, shock, hemorrhage, and pain. These vary greatly in different individuals, and one need not expect to find them all present and as pronounced in

every case, nor should the absence of all of them excuse the
physician from making a most careful examination into the
extent of all such injuries.   The absence of external evidences
of injury may be very deceiving.   While there may be no
blood discharged, the peritoneum and the upper cavity of
the rectum may be filled with it.   Tympanitis and abdominal
pain may occur immediately after the accident, or they may
be delayed for twenty-four hours, being preceded by a chill
and followed by all the symptoms of septic peritonitis; meteor-
ism, an anxious expression of the face, vomiting, hiccough,
and collapse may be present, soon to be followed by a fatal
termination.   Pain in the region of the pubis, dysuria, the
presence of urine in the rectum, or of blood and fæces in the
urine will indicate the involvement of the bladder in these
injuries.   Sometimes there is complete retention of urine, and
the patient must be catheterized.   In such cases one may find
fecal material and blood in the urine, or no urine in the bladder
at all, it having escaped into the rectum or peritoneal cavity;
early and careful catheterization is therefore important.

.   Aside from the subjective symptoms, an examination by
the finger and instruments, especially the proctoscope, will
indicate more clearly than anything else the size and extent
of the injury.   Do not be deceived, however, by the fact that
there is no leakage of urine or fæces immediately after a
puncture or gun-shot wound involving the bladder and rectum.
The congestion and œdema following the injury may entirely
close the tract of the missile temporarily, but it will soon
reopen with subsidence of the œdema, or through sloughing
of the tissues around the wound.   A guarded prognosis is
therefore necessary.

The rapid escape of air from the rectum when using the
pneumatic proctoscope, and inability to inflate it, should lead
to a strong suspicion of perforation of the peritoneal cavity
or bladder, even though there is no perforation seen or felt
in the rectal wall.

Treatment.—Little trouble may be anticipated from minor wounds or injuries of the rectum and anus if the cardinal principles of drainage and disinfection are carried out properly. Hemorrhage should be controlled by taking up the bleeding vessels if possible; otherwise by packing, care being always taken to irrigate the rectum with hot antiseptic solution before the packing is done; when the peritoneal cavity has been penetrated, sponging should be substituted for irrigation.

Perforations of the bladder through the rectal wall often heal spontaneously; therefore, in those cases in which there is no peritoneal involvement, early operative interference is not advisable. The bladder may be drained by a soft catheter, and the rectum kept as free from fecal material as possible by stretching the sphincter and frequent irrigations. If, after a reasonable time, the opening between the two fails to heal, and the condition develops into a rectovesical or a rectourethral fistula, then it should be closed by methods heretofore recommended. If fistulæ, abscesses, or ulceration follow these injuries, they should be treated as recommended elsewhere in this section.

Wherever there is good reason to believe that the peritoneal cavity has been opened by a wound in the rectum, an exploratory laparotomy should be done at once, and the site, course and extent of the injury determined. If there should be much extravasation of blood and fecal material into the peritoneal cavity, wash it out thoroughly with large douches of normal saline solution. If, however, there is only a very small quantity that has escaped, wipe off the parts that have been soiled with pledgets of gauze that have been soaked in a mild solution of bichloride of mercury. It is better to clean out Douglas's cul-de-sac by this method than by general irrigation, for by the latter one may distribute septic germs throughout the cavity. If septic peritonitis has begun Quenu advises prolonged lavage with normal saline solution at 40° C. Where the wound in the rectum, or sigmoid, is within reach through the abdominal wound, it should be sutured; this

cannot be conveniently done if the wound is low down in Douglas's pouch, although the operator may be assisted very much by the use of the colpeurynter in the rectum. Make no attempts to suture, however, until the pelvic cavity has been thoroughly cleansed, and the location of the wound packed off with sterile gauze. Whenever there has been extravasation in these cases, drain always with gauze running from the site of the intestinal injury to the lower part of the abdominal wound.

The treatment of rupture of the rectum calls for immediate laparotomy and suturing of the wound.

CHAPTER XVIII

FOREIGN BODIES IN THE RECTUM AND SIGMOID

FOREIGN BODIES are frequently met with in this part of the intestinal tract, and there are three methods by which they reach there: first, by being swallowed; second, by being developed in some portion of the intestinal tract; third, by being introduced through the anus.

Medical literature abounds with instances of foreign bodies of the most varied and marvellous character that have been swallowed and subsequently found in these cavities, such as chicken- or fish-bones, the outer hull of an apple-seed, false teeth, tin tags, etc., etc.

There are certain conditions that predispose to the formation of foreign bodies in the intestinal canal. These depend upon the altered or deficient secretions from the intestinal canal, the liver, or the pancreas. Enteroliths have their origin in small bodies that have been swallowed and around which the lime salts incrustate. Those who live in limestone regions and drink the hard alkaline water are especially inclined to the formation of these calcareous masses in the intestine.

As a predisposing cause may be mentioned constrictions in the sigmoid or rectum, growths, hypertrophy of Houston's valves, paralysis of any portion of the large intestine, diverticula, displacements, or adhesions of the sigmoid or colon, hypertrophy, and spasm of the external sphincter.

For various reasons foreign bodies are frequently introduced into the rectum, and while it is always with the knowledge of the patients, the purposes for which they are introduced are of such a nature that they will not admit it until forced to do so by pain and distress.

In a certain number of cases foreign bodies are introduced into the rectum by ignorant people for the relief of certain

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conditions or symptoms, as for constipation, or its reverse condition, diarrhœa.

Again, the rectum has been, for a long time, made use of by thieves and criminals for the purpose of concealing stolen articles and instruments for crime.

Foreign bodies have also found their way into the rectum by accidents, as by falling on pointed sticks, or on the palings of fences, which after penetrating the rectum are broken off and left there.

Under this heading may also be mentioned those distressing cases in which foreign bodies have been introduced for the purpose of exciting passion in depraved individuals, where the object has slipped from their grasp and passed up into the rectum.

The length of time that a foreign body that has been swallowed will take to pass from the stomach to the rectum varies from twelve hours to several months.

Some remarkable cases have occurred in which large bodies that have been introduced into the rectum have worked their way upward until they were beyond the reach of the hand or of instruments used for their removal.

Symptoms.—The symptoms will depend very much upon the size and shape of the body; if smooth, round, and not very large, it may give rise to very few symptoms; but if large and irregular, with sharp edges or points, it will cause pain and tenesmus. Again, the pain and tenesmus will depend upon the location of the foreign body, being more pronounced when it is low down in the rectum. If the mucous membrane or the walls of the rectum have been penetrated, the pain will be more or less constant, especially if the foreign body is grasped by the sphincter, in which instance the case will likely present the symptoms of fissure in ano. The irritation from the foreign body is likely to bring on numerous stools, which, in the absence of any direct history concerning the foreign body, may mislead the physician. Genito-urinary symptoms are a very frequent complication of foreign bodies in the rectum.

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When the body has remained for some time in the intestine and produced much irritation, grave constitutional symptoms, with high temperature, may supervene.

In certain cases where the foreign body is very large, a bulging of the perineum may be felt and seen.

Diagnosis.—The only reliable means of diagnosis in these cases is the educated touch and the proctoscope, the latter to be used only when the body has passed up beyond the reach of the finger; then it can be used, not only as a means for making the diagnosis, but through which the foreign body may be grasped with forceps and pulled down. In those cases in which the foreign body is small and is arrested in one of the crypts of Morgagni, a single-bladed speculum, such as the one I designed, would be of special advantage in making the diagnosis, reflected light being used to illuminate the field of inspection.

Complications.—In the spontaneous expulsion of foreign bodies, wounds and tears are likely to result; the retention of the foreign body in the rectum for some time may result in erosions or ulcerations of the surfaces; in thickening of the rectal wall; in invagination or prolapse of the rectum. These conditions may call for subsequent attention and treatment.

With the history and symptoms of a foreign body in the rectum, it may yet be impossible to demonstrate its presence, either by digital examination or the proctoscope. This may be due to the fact that the foreign body has been dropped into a diverticulum, or has penetrated the rectal wall and passed into the surrounding tissues.

Prognosis.—While most of these cases end favorably, quite a number have died from infection, hemorrhage, or peritonitis.

Treatment.—Difficulties attending the extraction of foreign bodies from the rectum may well be appreciated, when it is remembered that they are generally introduced with the conical end upward, and have behind them a tight and frequently an irritable and painful sphincter.

Where the body is soft in character it may be grasped with forceps, but when hard in texture and smooth it will tax every ingenuity of the operator to remove it, especially as he has to keep constantly in mind that much pressure from below is likely to push it farther up the bowel, or if the upper end of the object is pointed much manipulation and pressure on the abdomen may cause it to perforate the intestine and bring on fatal peritonitis.

Generally it will be necessary to anæsthetize the patient and dilate the sphincter before any attempt at removal is made. Then the bowel should be well irrigated with an antiseptic solution to remove any cause of infection, and this should be followed by an injection of sweet or cotton-seed oil, to lubricate the parts well. If the calibre of the anus is found too small for the removal of the foreign body, it will be advisable to split the anus and rectum backward towards the coccyx sufficiently to allow its removal. The necessity for this procedure is the result of the congestion and œdema which has followed the pressure of the foreign body. When the lower end of the foreign body is rough and serrated it will be necessary to protect it with gauze to prevent the serrations from catching in the mucous surface.

When the foreign body is composed of soft metal, such as hair-pins or safety-pins, they may be cut with forceps.

Where the object is of glass or china, the small placental forceps may be used to extract it; they should be wrapped with gauze, if there is danger of the glass breaking, to prevent the pieces of glass from wounding the mucous membrane.

Always after removal of a foreign body from the rectum this organ should be thoroughly irrigated with an antiseptic solution, such as boric acid or 10 per cent. peroxide of hydrogen. If the bowels have not been moved, a mild cathartic, such as castor oil or comp. licorice powder must be given at once to remove any undue accumulation of fecal matter. As soon as this result has been accomplished an opiate should be given

to quiet peristaltic action. Irrigations with very cold or very hot water, and pressure by packing, are the best means to control hemorrhage.

Removal by Cœliotomy.—When large bodies have passed upward beyond reach, or have been arrested in their passage from above downwards in the upper part of the sigmoid flexure, it may be advisable to open the abdominal cavity at once, make a longitudinal incision in the gut, and remove the foreign body through this aperture. If the bowel is healthy the incision in it should be closed at once, and dropped back into the abdominal cavity; if gangrenous, then all the diseased part must be drawn outside, and the healthy edges of the bowel stitched to the abdominal wound. The diseased portion of the bowel may be cut off, or if it resumes its normal condition it can be closed and restored to the abdominal cavity at a later date.

The incision for such an operation should always be made at the left side and in the line with the rectus muscle.

When attempting to remove the foreign body through an abdominal opening, the portion of the intestine in which the foreign body is located should be drawn outside of the abdomen if possible and the abdominal wound packed with gauze before the intestine is opened. Sometimes on account of its short mesentery it will be impossible to do this completely.

If the foreign body has escaped from the intestine into the abdominal cavity, laparotomy should be performed, the foreign body removed, and the rent in the bowel, through which the foreign body passed into the abdominal cavity, should be sewed up, after which the abdominal cavity should be thoroughly washed out with sterile water and closed.

G. W. Combs, of Indianapolis, Indiana (*Journal of the American Medical Association,* October 23, 1909), reports a very interesting case:

History.—J. L. was admitted to the City Hospital, June, 1909. He had been drinking heavily for four days, and one evening went to a wood beside a railroad, where he lay on

the ground, falling asleep and not waking until morning. He found it impossible to empty the bowel on account of an obstruction and pain. There was in the rectum a beer glass about seven inches in circumference at the larger end, a little more than four inches in length and conically shaped. He applied for help to a physician who attempted to remove the glass, without divulsion, with forceps. The attempt failed and the glass was broken.

He was admitted to the hospital about 3 P.M. and the glass was removed about 5 P.M. The smaller end had been introduced first, and when seen at 5 P.M. was resting up about the promontory, the larger end, a segment of which had been broken out in the effort at removal just mentioned, was imbedded in the hollow of the sacrum, the cutting edges being buried in the soft tissues.

Operation.—The œdema and swelling, and the contraction of the levators and sphincters from traumatism were such that thorough divulsion was insufficient for removal. The muscles were divided in the median line posteriorly, sufficiently to effect the removal of the glass, and on account of the extensive swelling and œdema, and the presence of an ichorous, bad smelling discharge, the wound was not stitched but left to heal by granulation, as in posterior proctotomy for stricture. When the patient was discharged he had perfect control over his fecal discharges.

HYSTERICAL OR IRRITABLE RECTUM; NEURALGIA OF THE RECTUM; OBSCURE DISEASES OF THE RECTUM

THE condition ordinarily described as hysteria has of late years received much more attention and consideration from physicians than formerly and has generally been found to be associated with some diseases of the ovaries or uterus, although in many cases the etiology is still shrouded in darkness. In most cases of hysterical rectum, however, if one searches long and carefully enough, he will generally find some local or reflex cause to account for the symptoms.

Dr. William Goodell has stated that few muscles of the body are exempt from attacks of hysteria, and those that are most liable to be so attacked are the circular muscles. In most of the cases so affected, according to this author, one finds symptoms of nervous prostration, backaches, and nervousness, but the chief symptom is referred to the rectum. So exaggerated may this symptom be that it masks all the others and leads one to believe that he is dealing with some pathological lesion of this organ.

In some cases the symptoms closely resemble those of an anal fissure; in others the pain is higher up than the sphincter muscle, with a tendency to return periodically; and in others still there is a throbbing, pulsating pain that occurs before and during defecation, but disappears after the bowels have been emptied. In addition to those associated with actual pain, there are others described by Goodell in which the sphincter muscle is persistently and powerfully contracted without any appreciable cause to account for it.

In some cases defecation is followed by great exhaustion, whether the stool is fluid or solid. In others the rectum is so

sensitive and irritable that the least pressure from the fæces
or from the nozzle of the syringe will bring on spasm and
actual agony.

The least excitement from social, business, or other causes
will sometimes bring on either a relaxation of the sphincters
and inability to control the movements of the bowels, or a
spasm of those muscles which unfits the patient for society
or business.

Notwithstanding the practical denial by Dr. Mathews of
the existence of any such symptoms without a corresponding
pathological lesion, yet after giving full credit to reflexes from
other organs, especially the reproductive, there still exists a
certain number in which it is impossible to find a pathological
cause for the erratic symptoms; nevertheless the search for
the cause should be most careful and painstaking in every
instance. The lesions to be looked for in such cases are small
fissures; scar tissue from sores that have healed; hypertro-
phied papilla which have prolapsed and been caught in the
grasp of the sphincter; small polypi; inflamed hemorrhoids;
small fecal concretions. Foreign bodies in the crypts are very
common causes, yet likely to be overlooked. The pressure of
a fecal mass during periods of constipation may produce irri-
tability of the rectum, congestion, hypertrophy, and spasm of
the sphincter, and along with these changes there is an increase
in the fibrous elements which constricts the ends of the nerves,
producing neuralgia.

REFLEX IRRITATIONS.—The most familiar of these are
those that arise from lesions in the genito-urinary organs. It
is well known to all surgeons, and even general practitioners,
how the rectum and the genito-urinary organs react on each
other, and how a disease in one may find its most prominent
expression in some reflected symptom in the other. Where
no organic lesion can be found to account for the symptoms
in the rectum, a systematic examination of the other organs
of the pelvis should be made.

Frequently, however, nothing will be found in any of these organs to account for the neuralgic pains or irregular symptoms which occur. In such cases turn your attention to the nervous system, especially the spinal cord. Spasm and pain in the rectum are frequent symptoms in the beginning of locomotor ataxia. In many cases these pains occur in the rectum before they do in the legs and in the course of the sciatic nerve.

Allingham has noticed the same to occur in certain cases of impaction of fæces in the rectum or sigmoid; symptoms of insanity with delusions have appeared, which have disappeared when the impaction has been relieved.

Not infrequently gout and rheumatism have been known to produce these pains. In such cases large doses of the salicylates generally give prompt relief, as do also full doses of colchicum in cases due to gout.

LOSS OF NORMAL SENSIBILITY.—In this condition the sensibility of the rectum is below par, and response to normal stimuli is wanting. This condition may come on suddenly after the bowels have been moving regularly for weeks, when, following a period of excitement or nervous strain, there appears a diarrhœa with involuntary passages of fæces. The patient will have no warning of such an accident until the actual escape of fecal matter and is likely to become depressed and hypochondriacal. Such a condition may be entirely independent of any previous operative procedure on the rectum, and in those cases where it is entirely independent a satisfactory explanation may be looked for and found in defective sphincteric control by the spinal centre, which in turn is the result of a defective link somewhere in that special reflex arch.

Treatment.—The line of treatment to be adopted will depend upon the exciting cause, if it can be ascertained or suspected. Removal of it or its treatment is always called for. Where there is hypertrophy with spasm of the sphincter it should be dilated or incised; hemorrhoids, or hypertrophied papillæ should be removed; ulcerations should be treated with

appropriate applications; congestions by irrigations of cold water; and defective nerve control by the internal use of strychnia, cold packs to the lumbar and sacral regions of the spine, with the daily use of the faradic current.

When there is a prolapsed ovary, a retroverted or prolapsed uterus, an enlarged prostate, stricture, or any pelvic lesion that may act as a reflex in producing the rectal symptoms, they should receive prompt and appropriate treatment. There still remain a certain number of cases in which no organic disease can be found in the rectum, pelvic organs, spinal cord, or brain, as causative and most of these cases are the victims of anæmia or autotoxæmia and nervous exhaustion. The treatment therefore may safely consist in rest, forced feeding, tonics, and change of environment.

CHAPTER XX

PATHOLOGICAL LESIONS OF THE COCCYX

THE coccyx, being one of the main stays for the support of the rectum, always involves the latter to a greater or less extent when diseased, which is my excuse for alluding to diseases affecting it in a work on the rectum and anus. I will, however, give a detailed account of the subject.

The following is a list of its affections which concern us here: malformations of the coccyx; fractures and dislocations of the coccyx; sacrococcygeal tumors and cysts; coccygodynia.

Malformations.—Not infrequently we have a congenital deformity of the coccyx, either with a lateral, anterior, or posterior deviation. In cases of anterior curvature the rectum may be caught between the end of the coccyx and fecal concretions, causing considerable irritation or ulceration. In cases of posterior curvature the tension of the skin over the curved coccyx may result in ulceration. These conditions may pass unnoticed unless the deflection is sufficient to interfere with the surrounding tissues, when it will be readily recognized by the attending pain and irritation, which should lead to the necessary examination which will reveal the cause of trouble. When there is ulceration in the rectum from an acute anterior deflection there will be discharges of pus and blood from the anus.

Treatment.—This malformation is best corrected by removing the coccyx, the technic of which will be subsequently given under the head of coccygodynia.

Fractures and Dislocations of the Coccyx.—From its dependent position the coccyx is very subject to fractures or dislocations from violent falls upon the buttocks; this condition is readily recognized. The pain and discomfort, especially upon flexing the body upon the hips, will direct the

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attention of the physician to the part, which, taken in connection with the history of a fall, should suggest an immediate examination. This is best done by introducing the index finger into the rectum and with the thumb over the coccyx, when either crepitation or a very movable coccyx will be recognized. It should be borne in mind that there may be a congenital movable coccyx. In either case, however, the treatment would be the same.

Treatment.—On account of the attachment to the coccyx of ligaments and muscles, the slightest contraction or extension of which makes it impossible to fix the bones after they have once been separated from their adjoining segments or the sacrum, little can be done by palliative measures to relieve the discomfort of the patient, except by confining him to the recumbent position and making his evacuations as soft and easy as possible. Here, as in the preceding condition, immediate and complete extirpation affords the quickest and best results.

Sacrococcygeal Tumors and Cysts.—The coccygeal body (Luschka's gland) may become inflamed and swollen, or it may undergo degeneration and result in the formation of a cyst or abscess; this can be readily recognized by the swollen condition on the anterior surface of the coccyx and the tenderness experienced by pressure on passing the right index finger in the rectum and the thumb over the coccyx.

When the coccygeal body has become inflamed and painful it will be best to apply an ice pack in the early stages of the trouble, but later hot applications and suppositories will be best. When these remedies fail the coccygeal body and the coccyx may both be extirpated at the same time.

Braune was the first to classify sacrococcygeal tumors, in 1862, and to recommend the different methods for their treatment. Since that time Holmes has suggested the following classification: (*a*) tumors assuming the forms of supernumerary limbs, the result of double fetation; (*b*) tumors with fibrofatty (lipomata) constituents where congenital *duration*

is not apparent; (c) congenital tumors which enter the pelvis, not of fetal origin.

These tumors may be attached by a broad base or narrow pedicle, and vary in wide extremes in their contents and size. They may be globular, oblong, and irregular in shape; solid, semisolid, or soft.

Most of these are congenital, with the exception of the lipomata, and are rather rare except the dermatoid cysts, described elsewhere, under the head of Benign Tumors. These are readily recognized when attached to the posterior surface of the sacrum or coccyx, but when from the anterior surface they may not be observed until sufficiently large to interfere with the functions of the rectum by pushing it forward. In exceptional cases they may have attained such size as to dislocate the coccyx and lower part of the sacrum backward, and to cause prolapse of the rectum and eversion of the anus.

Constipation, of course, is very marked in these extreme cases, and is probably one of the first symptoms to call attention to those growing from the anterior surface of the coccyx before the tumor has become very large. These tumors break down and form abscesses which result in fistula, or the fistula may be the result of a previous necrosis of the coccygeal or sacral segments. In the congenital tumors, as spina bifida, the cavity of the tumor communicates with the spinal cord.

A digital examination of the rectum is always necessary in those tumors that grow from the anterior surface of the bone to ascertain its attachments, and for the purpose of palpation.

Treatment.—These tumors should be dealt with by radical measures only, some of which are as follows: (a) tapping, (b) partial resection and ligature, (c) complete extirpation.

TAPPING.—Only resort to this as a palliative measure, as the tumor refills with fluid very soon, and, when done, the fluid should be withdrawn slowly so as to avoid the risk of convulsions.

PARTIAL RESECTION.—This is only done as a result of failure in the attempt at total extirpation, where the attachment has been so extensive and deep as to make extirpation impracticable. In this partial resection let as much as possible of the tumor be ligated and removed.

COMPLETE EXTIRPATION.—This is the most desirable method of getting rid of sacrococcygeal tumors, unless they are connected with the spinal canal; when such is the case it is best to let them alone.

The technic of the operation is as follows: A free incision is made over the tumor and the latter carefully dissected out from its neighboring structures with the finger or blunt scissors. When the tumor is attached by a pedicle it should be traced upward to its origin, where it is extirpated completely. When cystic in character every precaution should be taken not to puncture the cyst wall. If the peritoneum has to be opened, let it be subsequently closed with cat-gut, the external incision likewise closed with the same, unless there is great tension, when silk sutures may be used.

When there are supernumerary limbs attached to the tumor they should be amputated or resected, as circumstances demand. Where necrosis occurs, from whatever cause, remove the dead bone, curette the surrounding parts, and leave the wound to heal by granulation.

Coccygodynia.—Coccygodynia is a persistent pain referred to the region of the coccyx; it is confined almost exclusively to women who have given birth to children. The pain is due to rupture or stretching of the ligaments surrounding the coccyx, or fracture or dislocation of that bone.

The condition was first described by Dr. J. C. Nott, of Alabama, in 1844 ("Extirpation of Os Coccyx for Neuralgia," *New Orleans Med. Jour.*, 1844–5).*

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* Skene, in his *Diseases of Women*, says: "This was first described by Dr. Nott in the *North American Journal*, May, 1844, but it attracted little attention until 1861, when Sir James Y. Simpson revived the subject and gave it the name of coccygodynia."

ETIOLOGY AND PATHOLOGY.—While coccygodynia occurs most frequently in women who have borne children, in whom it is due to injury of the bone or its ligaments during childbirth, yet it may follow injuries to the parts from other causes, in males as well as females, as from falls on the buttocks, or from blows over the region of the coccyx. The coccyx may also be the seat of rheumatism or neuralgia, or the coccygodynia may result from displacement of the coccyx by coccygeal tumors, or from inflammation of the coccygeal body.

Symptoms.—It is characterized by a very annoying and persistent pain in the region of the coccyx while in the erect position, and for some time after lying down, comparable to a dull toothache, which by its persistency makes the patient very nervous. The pain is very much increased by exercise, especially when leaning the body forward, by the act of defecation, or by any sudden movement that affects the mobility of the coccyx.

DIAGNOSIS.—The diagnosis is very readily made from the history and from a digital examination with the index finger in the rectum and the thumb over the coccyx. The slightest movement of the coccyx by the thumb and finger will increase the pain very much, there will be added exquisite tenderness, there may or may not be mobility of the parts according to the amount of stretching the ligaments may have sustained, or whether or not there has been any dislocation. The absence of any swelling would differentiate it from a tumor or inflammation of the coccygeal body. In some cases the pain may be referred to some neighboring organ, but the history of a fall, or having borne children, and an increase of pain by a movement of the coccyx, will enable us to make the proper diagnosis.

Treatment.—Palliative measures are generally of little avail, although occasionally they may afford permanent relief. Of these measures, rest is decidedly the most important; the next is the avoidance of all means likely to produce spasm of

the coccygeal muscle, and the use of such local measures calculated to relieve such spasms; of the first, the avoidance of constipation, or any sudden movement affecting the coccyx; of the second, hot applications are most soothing and effectual. In some chronic cases brushing the parts over with the cautery at a dull red heat is very efficacious. When these palliative means fail, surgical methods should be resorted to.

SURGICAL METHODS.—One of two methods may be adopted for the relief of this trouble; first, small tenotomy, or total excision.

Tenotomy.—This operation was first performed by Prof. J. Y. Simpson, and the results following were very satisfactory, but of late the operation seems to have fallen into disuse. The technic is as follows: A tenotomy knife is introduced through the skin near the tip of the coccyx and passed upward directly over the posterior surface of the bone, which is now freed from all attachments to the adjoining parts. The tenotomy knife is now turned at an acute angle, first on one side, then on the other, when all lateral attachments are severed, and the incision is extended beyond the tips of the bone from one side to the other, thus severing the bone from all its attachments, except at its base with the sacrum. The bone is thus relieved from all movements by the muscles, and perfect rest is secured. While this method may relieve a certain number of cases, it is not likely to answer where the bone is the seat of disease, so I prefer excision as being more certain to relieve the difficulty, and by the method suggested by Samuel G. Gant it is quite as readily and easily performed.

Total Excision.—The former methods of excising the coccyx were quite tedious and rather difficult, and the practise of leaving a drain in the wound delayed healing considerably. The operation devised by Gant simplifies the operation very much and gives most satisfactory results, and is the best that has been recommended. He has devised a pair of scissors especially constructed for this operation (Fig. 148), which are

very strong and blunt at the point, and the only additional instruments needed are a large curved needle, a needle-holder, and plain cat-gut sutures. Here is his technic:

FIG. 148.—Gant's scissors for excising the coccyx.

FIG. 149.—Excision of the coccyx.

1. The skin and deeper tissues over the end of the coccyx are grasped with the thumb and index finger, so as to make a fold at right angles to the latter.

2. With one stroke of the scissors, cut through these structures down to the bone, making an incision one inch long, parallel with the coccyx.

3. Free and lift the end of the coccyx upward with the left index finger, and by rapid cuts detach all the tissues first from one side then from the other, and finally from the end of the bone.

4. Without changing the position of the finger, place the scissors at right angles to the coccyx (Fig. 149), and disarticulate or divide it, as the case requires.

5. Close the wound with two or three interrupted cat-gut sutures, and dress it with sterile gauze held in place by adhesive straps.

The advantages claimed for this method are, that it is bloodless, painless, and can be done with great rapidity.

CONGENITAL IDIOPATHIC DILATATION OF THE COLON
(HIRSCHSPRÜNG'S DISEASE)

THE frequency with which the sigmoid portion of the colon is involved in these cases of congenital dilatation, together with the fact that obstinate constipation is one of its most pronounced symptoms, is my reason for considering this subject in a Treatise of the Rectum, etc.

J. M. T. Finney, of the Johns Hopkins Hospital, has given the most complete résumé of the subject that we have been able to find, in an article which appeared in *Surgery, Gynecology and Obstetrics*, Vol. VI, page 624, 1908. To him I am indebted for the full report on this subject. " While Hirschsprüng was the first to bring this condition to the general attention of the profession in the year 1886 at the meeting of the Berlin Congress for Children's Diseases, yet it had been recognized and cases reported by a number of observers. The earliest reported cases to be found in the literature are those of Parry in 1825, and Billard in 1829. Parry's case was a male adult, who had suffered from digestive disturbances for years. Autopsy showed an enormously distended colon, containing an immense quantity of fæces. No obstruction could be found anywhere in the alimentary canal. Billard, according to Löwenstein, in 1829 reported the autopsy findings of a six days' old boy, the lower part of whose small intestine, together with the whole colon, was thickened and sclerosed.

" Von Ammon, in 1842, described a dilatation of the large intestine and rectum in a child shortly after birth, and recorded another observation in a fœtus about the seventh month. It is a curious fact that these observations, having such an important bearing on the etiology of the disease, should have been noticed so early and that so few similar conditions have

since been reported." Then come the reports of Oulmont, 1843; Banks, Bunfer, and Favalli, 1846; Little and Galloway, 1850; Gay, in 1854.

Henock, in 1861, gives a description of a fairly typical case in a young boy. In 1867 the first case from this country was reported by Lewitt, of Chicago. This was followed three years later (1870) by Jacobi, who reported a doubtful case of abdominal loop formation with fatal kinking of the intestine. No less than two hundred and six communications on this subject have been found by W. A. Fisher, who rendered Finney such valuable assistance in the preparation of this paper.

Finney states that his paper represents a review of their knowledge of the subject with a complete list of authors and their publications to January 1, 1908.

TERMS AND SYNONYMS.—This condition is designated by several synonyms, some of which depend upon the etiological conception of the disease, while others have to do only with the names of individuals. In the former class belong the terms " Megacolon Congenitum " (Mya) and " Congenital Idiopathic Dilatation of the Colon " (Hirschsprüng). In the latter belong Hirschsprüng's Disease, or Mya's Disease. The term " Giant Colon " has also been used by some authors (Formad, Osler, Futcher, etc.).

The term " Congenital Idiopathic Dilatation of the Colon " is the one generally used in this country.

There is abundant evidence that in the majority of cases the disease has its origin in utero, also that the affection is essentially a dilatation and hypertrophy and has in nearly all cases to do with the colon, especially the sigmoid flexure, and is without demonstrable cause, a fact proven by the clinical and pathological findings in almost every case.

CLASSIFICATION.—Hirschsprüng has suggested in one of his later papers the division of the cases into two groups: I. Those occurring in infancy (true megacolon). II. Those occurring in adult life (pseudomegacolon).

Marfan and Neter are very insistent upon an anatomic basis for the disease, namely, congenital elongation associated with loop formation in the colon. While this is not true in every case, as I point out later, still it is not out of place to call attention here to the fact that the large intestine, more perhaps than any other portion of the digestive tract, is liable to be the seat of malformations (Duval). The colon as a whole has a morphogenesis hardly completed, and the various changes in form, length, and position noted from time to time are probably but variations in the progressive evolution toward a final arrangement.

The frequent anomalies are, in all probability, but reversion types. All the segments of the colon may be involved, but most often it concerns only that segment whose evolution is still unfinished, *e.g.*, the sigmoid flexure.

Johannessen has pointed out that the position of the sigmoid flexure is very changeable, and does not depend upon its mesentery alone, but also varies with the quantity and consistency of its contents. It is easy to see how these anatomic variations might materially influence the accumulation of fæces in the colon.

ETIOLOGY.—It must be admitted at the outset that little is known as to the true cause of this affliction; indeed, it is a question whether a single cause could give rise to the various manifestations that have been noted by different observers as occurring in the course of the disease. The fact that so many theories as to its etiology have been advanced is the best evidence as to the uncertainty of our knowledge of the subject. It is highly probable that more than one etiological factor is concerned in its production, as no single cause that has been thus far discovered will satisfactorily explain every case. There have been suggested from time to time in the literature a number of different hypotheses in the endeavor to explain the causation of the affection.

" Many writers have looked upon it as congenital, as it frequently occurs in childhood. Among them is Hirschsprung

himself. Others, among them Fenwick and Treves, believe
that the dilatation of the colon is first the result of mechanical
obstruction, due either to a volvulus or a congenital stricture,
or to a spastic contraction. They believe that when the dila-
tation has passed a certain point it may continue, or possibly
increase, even though a mechanical obstruction be removed.
Other writers have explained megacolon as the result of dila-
tation due to colitis and fermentation of the intestinal con-
tents; still others have attributed it to the development of
valves and kinks; while Ibrahim asserts that an undue length
of the sigmoid is a sufficient cause for megacolon. Fig. 150

FIG. 150.—Megacolon or Hirschsprüng's disease. (Petrivalsky, *Progressive Medicine*.)

(*Progressive Medicine*, Vol. XI, No. 2, June 1, 1909) gives
a good idea of the appearance of the patient before operation.

"In my own case the picture presented by the disease cor-
responded in every respect to, and suggested very strongly,
that presented by a lymphangiectasis as it is seen in other parts
of the body, *i.e.*, macroglossia, macrocheilia, etc. Here the
most striking feature, next to the immense size of the colon,
was the thickness of the mesocolon, which was composed
chiefly of enlarged lymph glands and enormously dilated
lymph and blood-vessels. The dilatation of the lymphatic and
vascular systems in the mesocolon corresponded exactly with
the dilated segment of the bowel. The whole appearance of
the dilated and hypertrophied bowel suggested hypernutrition,

a species of giantism, as it were, due to the increased amount of blood and lymph supplied to the affected portion. A section of the mesocolon together with one of the enlarged lymph glands removed at the time of the first operation showed nothing but a marked hyperplasia. That this hypothesis could explain all the cases seems very improbable, but that it may be the cause of a considerable number, however, seems equally probable since in a large proportion of the reported cases where the condition of the mesocolon is stated this same thickening and hypertrophy of the lymphatic and vascular elements has been observed.

" The clinical picture of the disease is usually a pronounced one. The cardinal symptoms are, obstinate constipation and an enlarged abdomen in a patient in fairly good health. The disease, as a rule, manifests itself very early in life; frequently the first passage of meconium being delayed several days. The constipation thus early begun may continue throughout life. In other cases the constipation may be noticed only after a few weeks, months, or even years. Under these circumstances, a movement of the bowels is always brought about with difficulty and rarely without the aid of enemata or cathartics, except during the periods of diarrhœa, which will be referred to later. This extreme difficulty in producing an evacuation is one of the characteristics of the disease. Enormous quantities and great varieties of cathartics, together with frequent large enemata, have been used with little or no effect. Unusual postures, assumed by the patient during the act of defecation or passing of gas, are reported by a number of authors, such as leaning over the back of a chair, standing on the head, knee-chest position, etc.

" The distention of the abdomen may be observed at birth, soon after, or at a later period, and is due to distention of the dilated portion of the colon with gas and fæces. The dimensions of the dilated abdomen are, at times, enormous; the circumference may be greater than the height of the patient. On inspection, one is struck at once by the disparity between

the size of the abdomen and the rest of the body, which is emaciated. The appearance of the abdomen is rather barrel-shaped. The greatest circumference lies usually somewhat above the umbilicus, the distance between the umbilicus and ensiform cartilage and the umbilicus and symphysis being very much increased over the normal.

" Just as abnormal as the dilatation of the abdomen is the length of time during which, in many patients, there is no stool. Frequently one gets a history of the patient going a week without a movement, periods of five weeks (Johannes-sen), six weeks (Roth), nine weeks (Rolleston and Hay-ward), and three months (Gay) have been noted. After shorter or longer periods constipation frequently alternates with diarrhœa, which usually relieves somewhat the abdominal distention, but this relief is only temporary, the abdomen never entirely regaining its normal dimensions.

" The face presents a rather dull, apathetic appearance. The skin is rather dry, harsh and leathery, except over the distended abdomen, where it may be tense or shiny. The complexion is frequently sallow or pasty. The veins over the abdomen appear distended and prominent. The abdominal walls are thinned and through them vigorous peristaltic waves, or coils of distended intestine, may often be observed. A diastasis of the recti muscles may occasionally be present. One of the most striking features is the change that takes place in the costal angle and plane of the chest wall. The former is rendered very wide and obtuse; the latter, instead of its normal approximately vertical position, as a result of the continuous pushing up of the diaphragm by the distended intestine becomes at times almost horizontal.

" The abdominal distention may or may not be uniform. In some cases the distended intestinal coils can be seen or felt more prominently upon one side than upon the other, more especially on the left side. This was pronounced in my own case. On palpation, one may at times feel masses of hard fecal matter filling the distended bowel. At other times the

abdomen is everywhere soft and is as a rule singularly free from tenderness. During the active peristalsis, the enlarged and distended loops of sigmoid can frequently be grasped in the fingers. On percussion the abdomen may be everywhere tympanitic, owing to the great accumulation of gases in the intestine. The area of liver dulness is much reduced and its lower border elevated considerably above the normal. At other times, dull areas may be elicited corresponding to the fecal impaction. Movable dulness has never been observed. Audible borborygmi have frequently been reported, sometimes so loud as to be heard in an adjoining room.

" The fecal discharges from the intestine are perhaps characteristic. Sometimes they are very dry and inspissated, at other times putty-like in consistency and of rather characteristic yellowish, brownish or greenish color, and having a peculiarly offensive odor. At other times the discharges, both solid and gaseous, have been noted as odorless. Vomiting is not a constant symptom and when it occurs it takes place late in the course of the disease, and is usually referable to some intercurrent complication. Pain is also not a marked nor constant symptom, being more pronounced when diarrhœa is present, or during active peristalsis.

"Œdema of the lower extremities and scrotum has been observed in a number of cases.

" On rectal examination, the sphincter is usually normal, although Fenwick and others have described a spasm which they believe to be of etiological importance. The majority of observers, however, have failed to note anything suggesting this condition. The rectum itself is usually found to be empty and relatively normal, though a ballooning of its walls has been noted and this in a considerable percentage of cases. Of some significance this, for it indicates an obstruction farther up. Anal fissures are rarely present and a rectal tube can usually be passed unobstructed for a considerable distance, frequently evacuating large quantities of gas or liquid fæces.

" Marked disturbances have been observed from time to time in the other structures of the body. The lungs will be found encroached upon by the changed position of the liver and the upward pressure of the diaphragm. The lower lobes of the lungs may be more or less atelectatic. Breathing will be largely costal. Dyspnœa, which may not be noticed at the beginning, may later become pronounced, interfering very seriously with the comfort and perhaps the life of the patient. Bronchitis or bronchopneumonia are not infrequently observed in the course of the disease, due, in all probability, to disturbed conditions in the chest, possibly to metastasis from the intestinal obstruction. The heart's action may also become very much interfered with, producing a weak and irregular pulse, dyspnœa, etc. The kidney function appears to be seldom disturbed, which seems surprising, seeing the increased intra-abdominal pressure, and the weight of the mass of contained fæces. Gee reports a case of double hydronephrosis associated with this condition, and Fenwick one of compression of both ureters with grave hæmaturia. Roth has observed in two cases a peculiar deformity of the bladder, consisting of a cone-shaped dilatation extending to the umbilicus. Germer and others have also noticed this and it was present in one of the Johns Hopkins Hospital list. Great increase in the amount of indican is not unusual; albumin and casts are not usually found.

" Eleven cases were recorded in the Johns Hopkins Hospital up to January 1, 1908, nine males and two females, seven whites and four blacks, their ages ranging from seven months to fifty-five years.

" As special aids to diagnosis in doubtful cases, enemata of bismuth and oil given in the knee-chest position, and an X-ray subsequently taken in the abdominal position, will give a fairly characteristic shadow. If the bismuth does not show in the descending or transverse colon, the distended loop must be the sigmoid. Diaphanoscopy may also at times be of

service. Remember, in differentiating between tubercular peritonitis and this disease, that ascites has never been observed in connection with Hirschsprüng's disease.

" In advanced cases there may be necrosis or perforation, with resulting peritonitis. Sometimes the mesocolon is greatly thickened. On microscopic examination the changes of chronic inflammation are especially marked in the mucosa, while the hypertrophy of the muscular coats is extreme. In other cases there has been noted a great thickening of the sub-mucosa. While it is established beyond question that in many cases of megacolon no obstruction exists at the time of observation, different writers are coming more and more to the view that obstruction at some former date was the starting point of the hypertrophy and over-development, even in the so-called congenital cases." (*Progressive Medicine*, June 1, 1909.)

PROGNOSIS.—The prognosis in Hirschsprüng's Disease is always uncertain. While the disease itself is rarely rapidly fatal, still the patient always leads a precarious existence, owing to malnutrition and digestive disturbances incident to the trouble. Intercurrent affections are very commonly observed, and not infrequently the cause of death is due to one of these. Peritonitis, the result of perforation, heart failure, and disease of the respiratory organs, particularly bronchitis and bronchopneumonia, are the most common of the intercurrent affections.

The prognosis is influenced by the age of the patient, and the younger the individual, the more unfavorable it must be.

Treatment.—After rectal irrigations and cathartics have failed to afford relief, do a laparotomy at once, before the patient has become too emaciated by the prolonged absorption of toxic material.

After varied experiences with colostomy, colopexy, entero-anastomosis, and resection of the affected portion of the bowel, with end-to-end or lateral anastomosis, the consensus of opinion at present is in favor of doing a primary anastomosis

between the ileum and the lower portion of the sigmoid or
rectum (Fig. 151, Bloodgood) to relieve immediate symp-
toms and to enable the patient to be better prepared for sub-
sequent resection of the hypertrophied and dilated colon.

FIG. 151.—Lateral anastomosis between the ileum and sigmoid. (Bloodgood.)

PATHOLOGY.—The principal seat of the pathological
process is in the large intestine, and in more than one third
of all the cases the sigmoid flexure is alone involved (Fig.

152). In practically all cases it was included in the affected portion: the whole of the large intestine was found involved in about 15 per cent., but the rectum and small intestine are rarely affected. In addition to the small intestine, the stomach (Gourevitch), the appendix (Muhlberger and Tschernow), and the œsophagus (Bergman), have been reported as taking part in the dilatation. The transition from the normal to the dilated portion is usually gradual, but may be abrupt, whereas the transition from the dilated portion to the normal is usually

Fig. 152.—Case of redundant sigmoid in a four-year-old boy. This was evidently the initial stage of Hirschsprüng's disease. The child suffered daily with intense colic, and with rarer attacks of almost complete intestinal obstruction. Fourteen inches of the sigmoid flexure were resected, followed by an end-to-end anastomosis. Recovery of child with complete disappearance of symptoms. (J. G. Clark.)

the reverse. There may or may not be evidence of mechanical obstruction of one form or another. These demonstrable forms of mechanical obstruction are more frequently met with in the adult than in the child, and may give rise to symptoms erroneously classified as Hirschsprüng's Disease. A pathological study of many of so-called cases would undoubtedly show them to be of a pseudomegacolic nature. As pointed out by Perthes, the characteristic of congenital idio-

pathic dilatation of the colon (true megacolon) is the inability to demonstrate a definite mechanical obstruction at an operation, or autopsy.   Upon opening the abdomen of a patient, the subject of this disease, one is at once struck by the enormous dilatation of the colon in whole or in part. The dimensions of the dilated portion are at times prodigious, reaching the diameter of six to eight inches (Treves, Hawkins, Formad, etc.). Its capacity is at times even more striking. Peacock's case contained sixteen litres, Formad's cases forty pounds, etc. The dilated portion occupies a prominent position in the abdomen, filling almost the entire cavity, pushing aside and compressing the small intestine and the remaining organs, frequently obscuring them entirely from view. The large intestine instead of following its usual arrangement disposes itself in two parallel limbs, running more or less perpendicularly.

The walls of the intestine show marked changes as the result of dilatation and hypertrophy: the serous coat is usually roughened, the ruga less pronounced, or obliterated. The whole colon may at times appear elongated, with increased loop formation as described by Marfan and Neter.

In advanced cases peritonitis may be present, due to necrosis of the intestinal wall and resulting perforation. External evidences of this necrosis may be found in the bowel wall, which is palpably thickened in most cases. The mesocolon is the seat of well-marked changes, consisting in variations in length, sometimes longer and sometimes shorter. At times it is of great thickness, due to the immense increase in the lymphatic and vascular elements, as manifested in the enormous dilatation of the lymph and blood-vessels and the increased size of the lymph glands, a condition resembling very closely lymphangiectasis. Upon opening the intestine, fæces in large quantities may be evacuated. As already pointed out, the intestinal contents are rather characteristic in color, consistency, and odor. The mucosa is frequently markedly pigmented, sharing to a certain extent in the hypertrophy of the rest of the intestinal wall. Patches of ulceration can fre-

quently be seen occupying larger or smaller areas and varying in depth from slight erosions to complete perforations.

Microscopic examination of the wall of the tremendous colon of Hirschsprüng's Disease shows an interesting picture. In general we have to deal with a quite uniform hypertrophy of all the intestinal tunics, especially marked, however, in the muscularis, and grafted as it were on this hypertrophy are many degenerative changes.

" The greatest interest in the pathological anatomy lies in what suggestions it might give as to the causative .factors involved. I own frankly that here, as often elsewhere, no real light has been shed on the question of pathogenesis, and this is certainly true in spite of the various interpretations of the histological picture made from time to time.

" Such a picture may be considered now as relatively constant, for on it all careful reports agree and it will support most of the various theories which have been advanced to explain Hirschsprüng's Disease. It will prove none of them."

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